AN INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

MAY 1957

Precision Metal Molding

PMM

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS

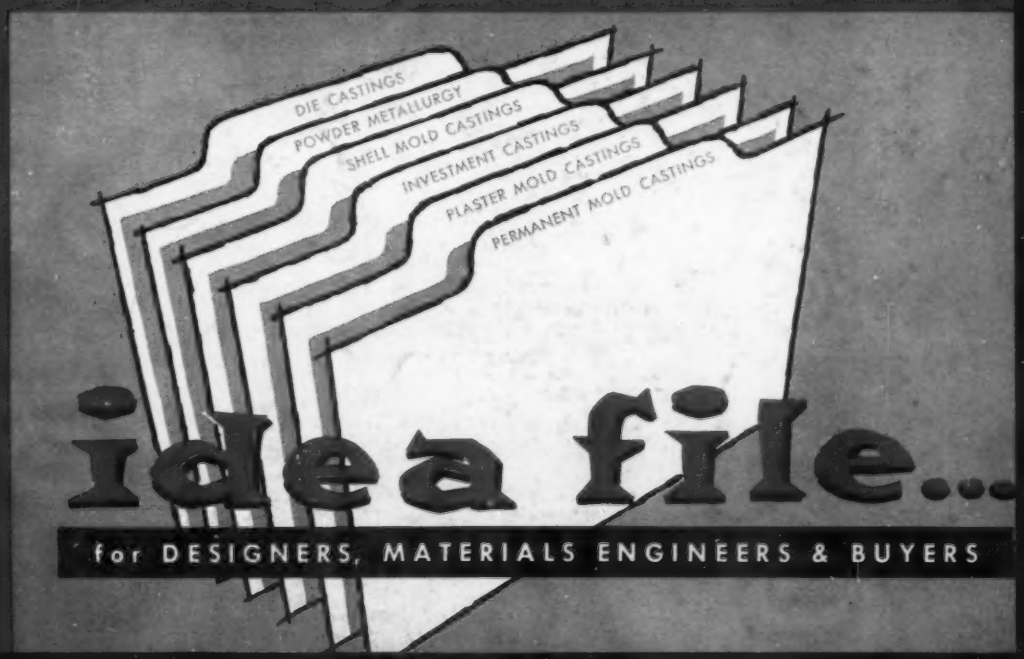
INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS



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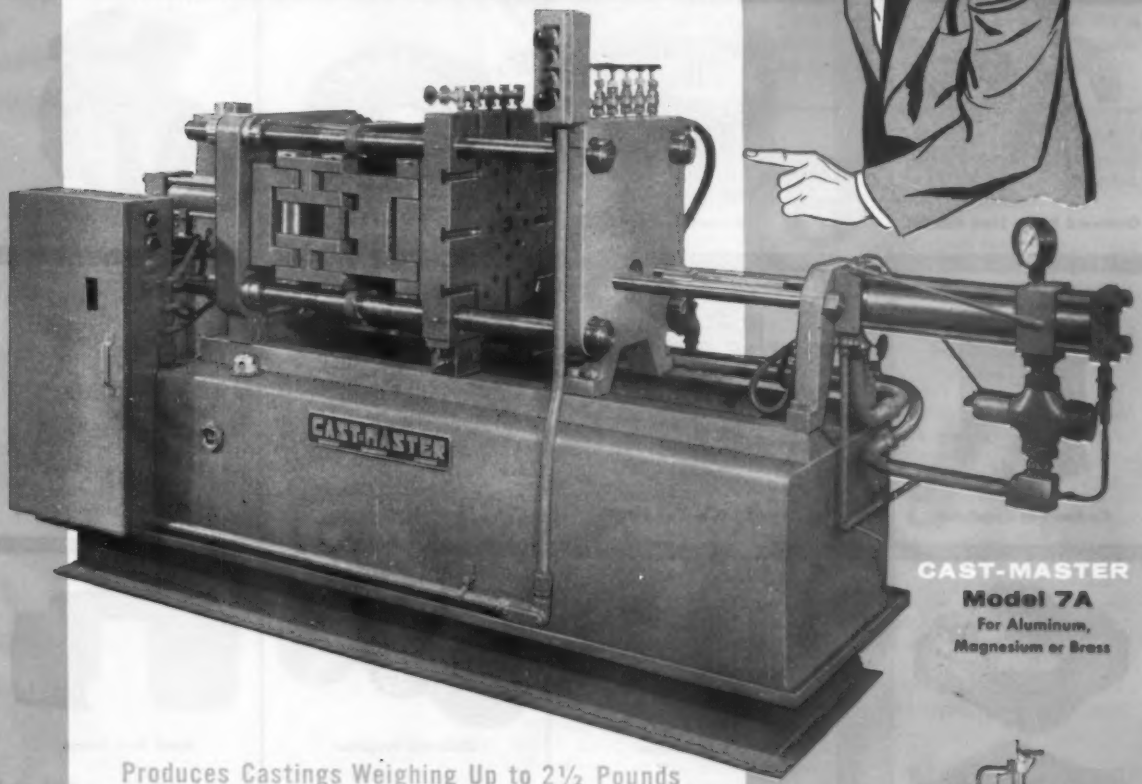

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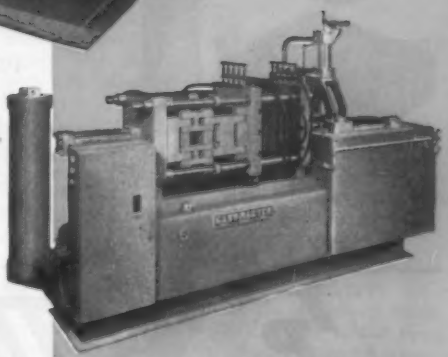

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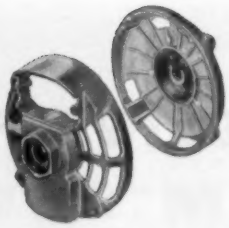
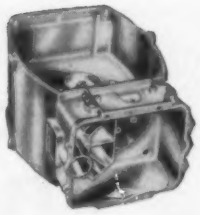
creative castings



Motor End Frames

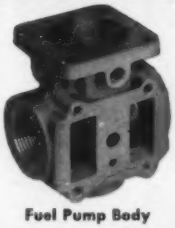


Gas Meter Housing

Outboard Motor Stern Bracket

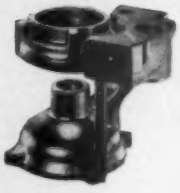
Aircraft Piston

Torque Converter



Fuel Pump Body

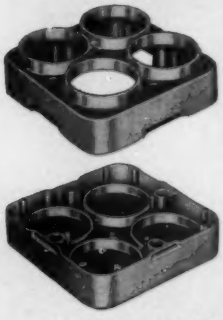
Carbon Pile Regulator



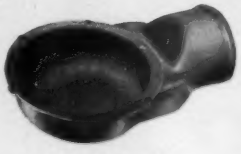
Aircraft Fuel Pump Body

Alternator Housing

Aircraft Fuel System Casting



Rocket Carrier Base



Air Connector

Outboard Propeller

Band Saw Frame

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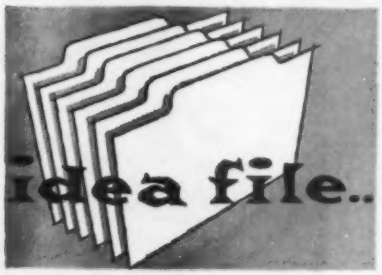
COVER



PRECISION MOLDED PARTS in metals fall into a natural grouping of processes. These processes are complimentary to each other and each has its individual advantages and limitations. No one process is a production cure-all; nor do the six different processes, when taken as a group, pretend to answer all design and production problems. As a group, however, they solve many production problems. Story on page 31.

FEATURE ARTICLES

31 IDEA FILE
To give design and production men some idea of the vast range of both simple and intricate parts that can be made by the Precision Metal Molding Processes, here are 85 varied examples.

32 PROCESS EVALUATION CHART
The choice of a process may not depend upon cost alone. Here are presented some of the more pertinent factors that must be considered when evaluating any process for cost analysis studies.

33 THE DIE CASTING PROCESS
The advantages, limitations, castable metals, and other properties concerning this process are here briefly discussed and twenty different examples of die castings given.

41 THE PERMANENT MOLD CASTING PROCESS
A brief resume of the important factors about the process that help to define whether it can be used or not. Also twelve examples of permanent mold castings that show the versatility of this process.

45 THE INVESTMENT CASTING PROCESS
The peculiar advantages of this process are discussed as well as some of its limitations. Twenty different examples are given that show the ability of the process to make both simple and complex parts.

51 THE POWDER METALLURGY PROCESS
A brief description, and twenty examples, of parts and process. The use of this process to make parts with normal properties or properties unique to the process is described and illustrated.

57 THE PLASTER MOLD CASTING PROCESS
A process that is singularly well adapted to the production of parts for short runs and for the manufacture of prototypes is described and eight typical parts shown.

61 THE SHELL MOLD CASTING PROCESS
The newest of the Precision Metal Molding Processes, this process is still growing rapidly. The presently known advantages and limitations are given briefly together with illustrations of typical castings now being made.

FINISHING SECTION

67 HYDRAULIC TRIM PRESSES FOR DIE CASTINGS
High speed hydraulic presses are finding ever increasing use in die casting shops on the trimming line. Here, one of the newer presses is described and the advantages of an hydraulic press for this work discussed.

TECHNICAL REPORT

111 FIRE-RESISTANT HYDRAULIC FLUIDS FOR THE DIE CASTING INDUSTRY
Part 5 of this article discusses the steps that are necessary when changing over from petroleum hydraulic fluid to one of the fire-resistant fluids. Detailed check lists for the change over are given.

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123 Opportunities

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Affiliated publications: AERONAUTICAL PURCHASING, APPLIED HYDRAULICS, FLOW, INDUSTRY & WELDING, MODERN OFFICE PROCEDURES, OCCUPATIONAL HAZARDS and COMMERCIAL REFRIGERATION AND AIR CONDITIONING. Not responsible for unsolicited editorial material.

Published monthly. Accepted as a controlled circulation publication at St. Joseph, Michigan.

Please return Forms 3579 to 812 Huron Rd., Cleveland 15, Ohio

PMM

MAY
1957
Volume 15
Number 5

copyright 1957
The Industrial Publishing Corp.
812 Huron Road
Cleveland 15, Ohio

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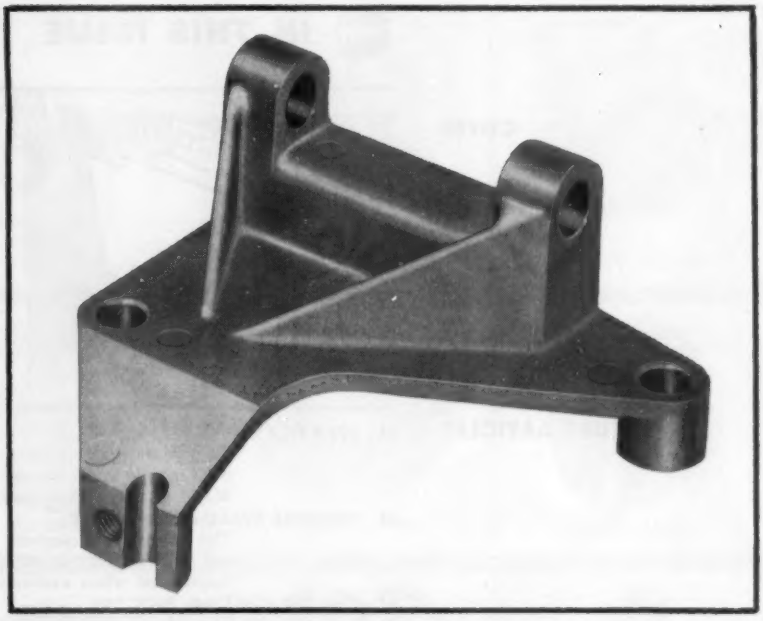

Simple for Die Casting — Complex and expensive by any other method

How else could you maintain close tolerances, keep costs in line with mass production processes and still keep the design flexibility the job calls for?

Only die casting can do it!

The manufacturer who needed this part knew, from American Die Casting Institute Product Standards,* that his requirements were within the capabilities of the process. Then he asked for application facts from Twin City engineers. By asking he saved money.

When you plan parts that call for precision, accuracy, flexible shapes . . . contact Twin City Die Casting. Twin City engineers can help you *design for die casting* to eliminate machining and finishing costs. They can take your part to any finishing stage you may desire thanks to Twin City's complete facilities.

For die castings, contact Twin City . . . you can probably save money. Many customers have.

*Product Standards available from Twin City Die Castings upon request.

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✓ offer such flexibility
✓ provide such accuracy

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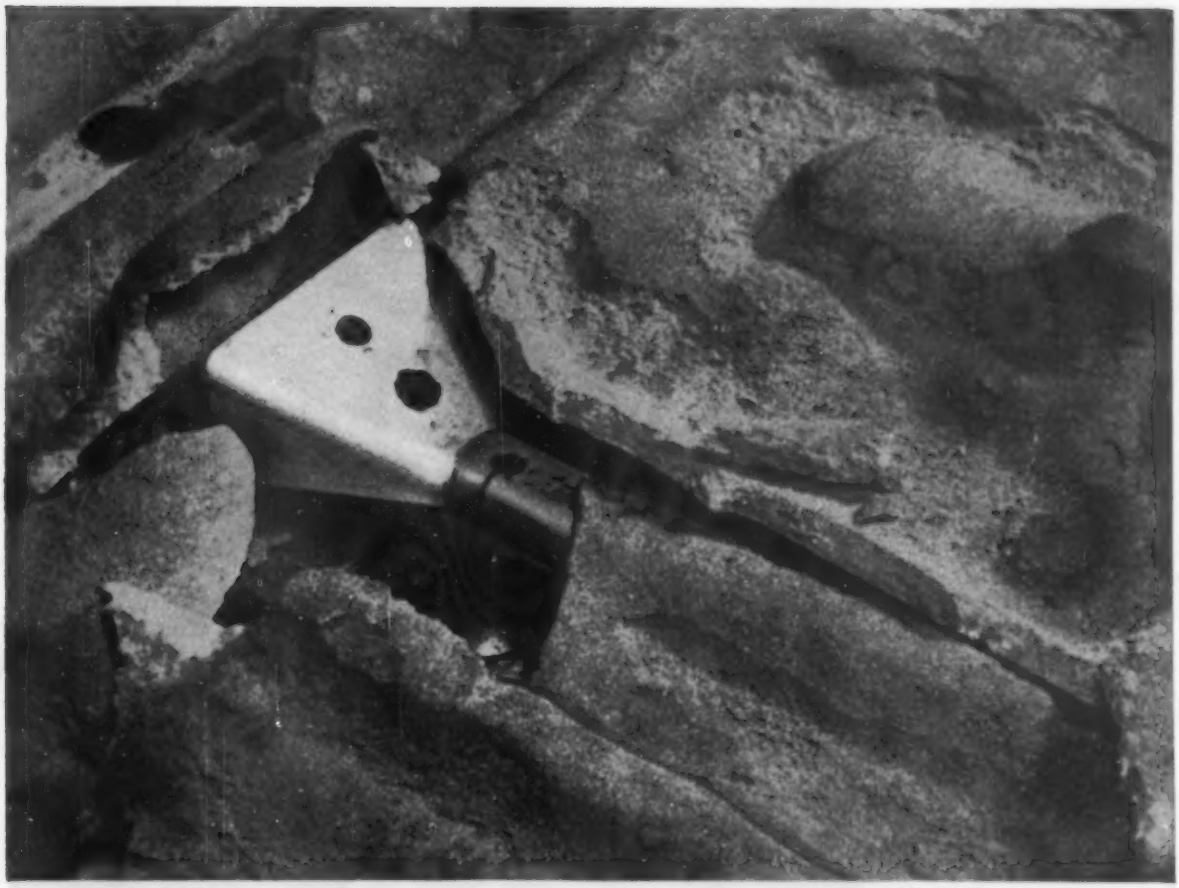

9 things to check if shells stick

You can profit most from the inherent advantages of shell molding—close tolerances, smooth surfaces and reduced labor costs, if you have the latest technical information on shell mold and core making techniques. Here's where General Electric's technical service and technical literature can help.

For example, G.E.'s *"59 Answers to Your Shell Molding Problems"* tells you nine things to look for when shells stick . . . and what to do about them. Here, too, you'll find answers to other shell molding problems you may have encountered.

And when it comes to shell molding resins, G.E. has a range of products, each designed to help you make better shell molds and cores for the job at hand. *G-E 12374*, fast curing resin for high speed production, minimizes warpage because of its "hot rigidity." *G-E 12368* is best for intricate patterns with deep draw and minimum draft. *G-E 12392* is a good general purpose resin. It has no tendency to peel; properties of build-up and release are good. *G-E 12316* shell bonding resin joins shell mold halves efficiently, and *G-E SM-55* silicone release agent gives quick, clean removal of shells from the pattern.

For a copy of "59 Answers . . .", or for other technical information, write General Electric Company, Section PM-3, Chemical Materials Department, Pittsfield, Mass.

IF SHELLS STICK . . .

• Check pattern for undercuts or rough spots • Be sure new patterns are thoroughly conditioned • Polish and recondition abraded patterns • Use proper lubricant • Avoid excessive lubrication • Clean pattern thoroughly • Use slower curing resin • Check ejection pin platen level • Look for loose pattern pieces.

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to market...to market...to buy INVESTMENT CASTINGS!

A single reliable "supermarket" for all of your precision casting needs? Yes sir! Regardless of size, complexity or material, all of your investment casting requirements can be met by Alloy Precision Casting Co — the nation's only foundry with both FROZEN MERCURY and LOST WAX facilities under one roof.

Not hampered by the limitations of a single process, Alloy Precision produces the most complete range of investment casting sizes (from less than 1/10 ounce up to 100 lbs.) in the most complete range of metals (including Magnesium and high temperature alloys).

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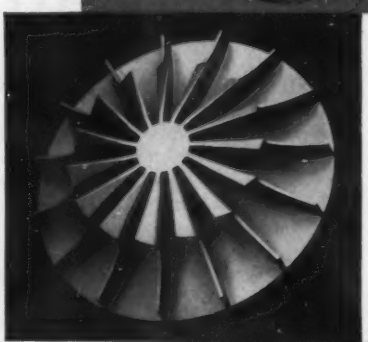
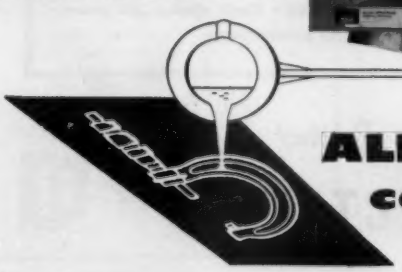


FREE GUIDES!

"HOW TO DESIGN, SPECIFY AND BUY INVESTMENT CASTINGS" literature includes description of Alloy Precision's modern plant and techniques. Write today! Send blue prints for quotes, design recommendations and value analysis to:



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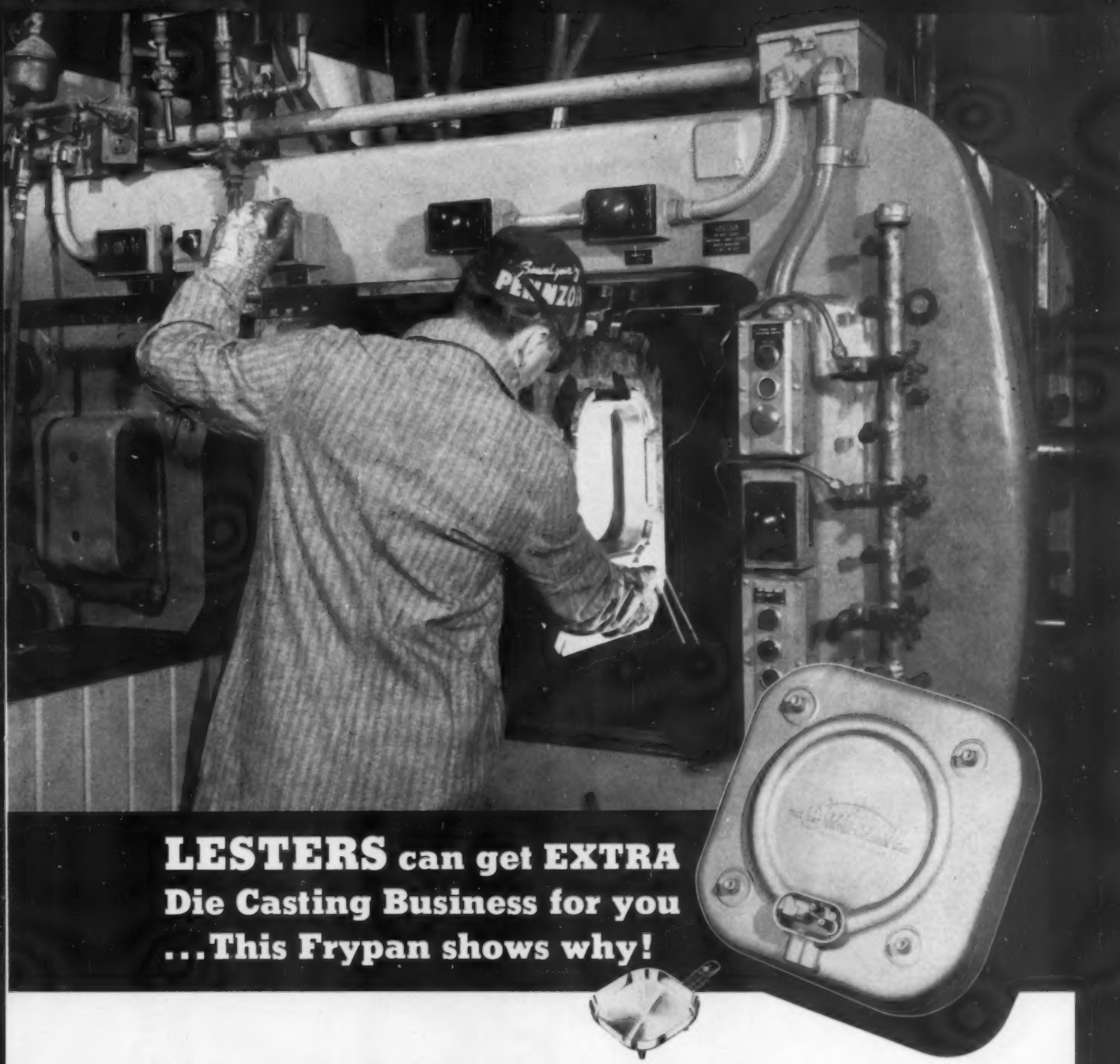

LESTERS can get EXTRA Die Casting Business for you ...This Frypan shows why!

Specifications: 121 square inches, heating element insert, absolute non-porosity to resist frying temperatures, and flawless finish. And to top it off, it had to be cast with No. 360 prime alloy, to provide the finest non-corrosive utensil. As you know, it's one of the toughest alloys to cast.

Nevertheless, Meta-Mold Aluminum Company in Cedarburg, Wisconsin, working exclusively on Lester machines, has been supplying Sunbeam Corporation with such fine parts for their automatic Frypan, that they have extended the life of the die from a normal 30,000 shots to an amazing 100,000 shots. Besides, secondary finishing costs have been cut to the bone.

Sunbeam Corporation has been so very impressed and pleased that they have ordered Lesters for their own plants, to assist in the production of the product.

Here's the clincher. Meta-Mold has been die casting for less than two years and has been out-performing more experienced vendors who don't use Lester machines.

Complete machine specifications available in Bulletin 101. WRITE TODAY.

LESTER-PHOENIX, INC.

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Some of the powder metal parts made on the Stokes Model 640 Press shown above, at Indar Corporation, Indianapolis, Indiana, are (left to right, below)—Copper bases for transistors, iron part for movie projector, iron throttle stop, iron diesel engine part.

Indar Corporation makes complex parts economically

. . . on STOKES POWDER METAL PRESS

Custom producer of powder metal parts finds versatility of Stokes Model 640 broadens the range of parts production from copper transistor bases to iron diesel engine components

Scores of kinds of complex-shaped parts are being manufactured at low unit cost and to close tolerances, on Stokes powder metal presses at Indar Corporation, Indianapolis. This economical method of production eliminates much of the labor, machining costs and waste of metal involved in cutting from bar stock. It makes manufacturing highly automatic . . . highly precise.

According to Indar president E. I. Larsen, "The geometry of the parts we are making is such that the Stokes Model 640 Press, with its multiple motions, is ideally suited to their fabrication. The Model 640 extends very appreciably the range of parts that can be pressed."

The Model 640, latest in the extensive Stokes line, embodies features that have been developed during more than 35 years of leadership in powder metal pressing. Independent press adjustments and direct-reading calibrations make the 640 exceptionally easy to set up . . . and to control from one, centralized location. It is uniquely suited to tooling for close tolerance and multi-level work. Parts are protected against breakage because of full support during the critical breakaway and ejection phases of the pressing cycle.

The press is completely enclosed . . . streamlined in appearance, designed for maximum safety in operation. It can produce a wide variety of parts, in materials ranging from pure metal and alloy powders to mixtures of metals and non-metals. It is designed to run continuously with minimum maintenance.

If you are now making metal parts by conventional machining methods, it will pay you to have the Stokes Advisory Service prepare an estimate of production costs by powder metal pressing. Our complete service covers laboratory production for sampling, design and fabrication of punches and dies, full installation services and instruction of operators in your plant. Write today for a consultation by a Stokes representative . . . and ask for your copy of "Powder Metallurgy Today" and Catalog 815—"Stokes Powder Metal Presses."

Powder Metal Press Division
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STOKES

These leading producers profit from Stokes powder metal presses

$25,000 yearly saved . . . $30,000 machine tool outlay avoided . . . by making lock parts in a Stokes press at Dixon Sintaloy, Inc., Stamford, Conn.

$20,000 per year cost-reduction was made on a wringer drive gear of iron and copper powder, for use on "Whirlpool" washers. Parts made by the Presmet Corporation, of Worcester, Mass. . . . on Stokes powder metal presses.

82% drop in cost is the story behind this drive gear for a home ice cream freezer . . . formed in a single operation on a Stokes press at Yale & Towne's metal products division, Franklin Park, Illinois.

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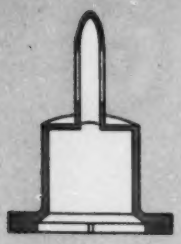
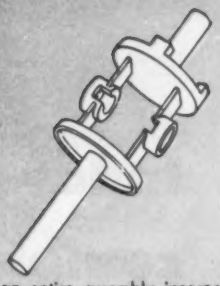
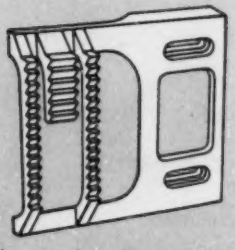


Here is an example of the complex internal coring possible with investment casting. Square, round, elliptical or irregular interiors can be cast.

The complexity of this part makes investment casting the only feasible method of manufacture. Prongs have perfect dimensional accuracy.



Here an entire assembly incorporating multiple functions is cast in one unit. "Keyhole" coring and a number of distinct surface details are required.



The sharp teeth of this sewing machine feed dog were cast in wear-resistant alloy to give longer wear than could be obtained from machinable material.

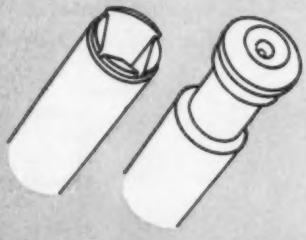
design with

austenal

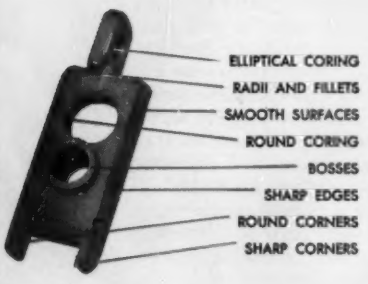
in mind

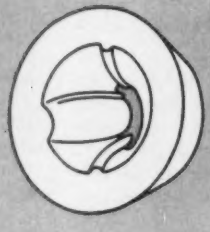
In planning parts, design directly for Microcast and take advantage of its wide range of design possibilities.

See not only what you can do, but what costly, time-consuming operations Austenal investment casting eliminates.



Cross-sections of irregular and varying thickness can be utilized. In this part the internal core diminishes from an irregular square to a small round hole.

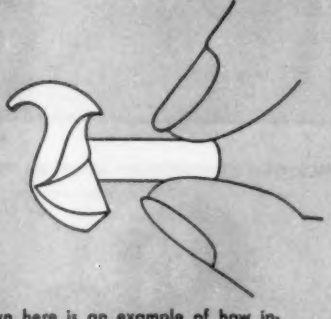




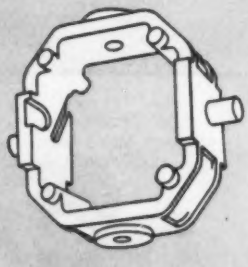
These extrusion dies of wear-resistant alloy are readily mass-produced with highly complex and irregular internal contouring.

Walls of varying cross-sections are possible. Here wall thicknesses change from thin to very heavy, allowing strength without bulk.

This very small part measures 1⅛" wide and less than ⅛" thick. Its thinness, rigidity and detail were possible only by investment casting.



Shown here is an example of how investment casting can virtually eliminate hand-filing and machining by keeping uniform, intricate detail.



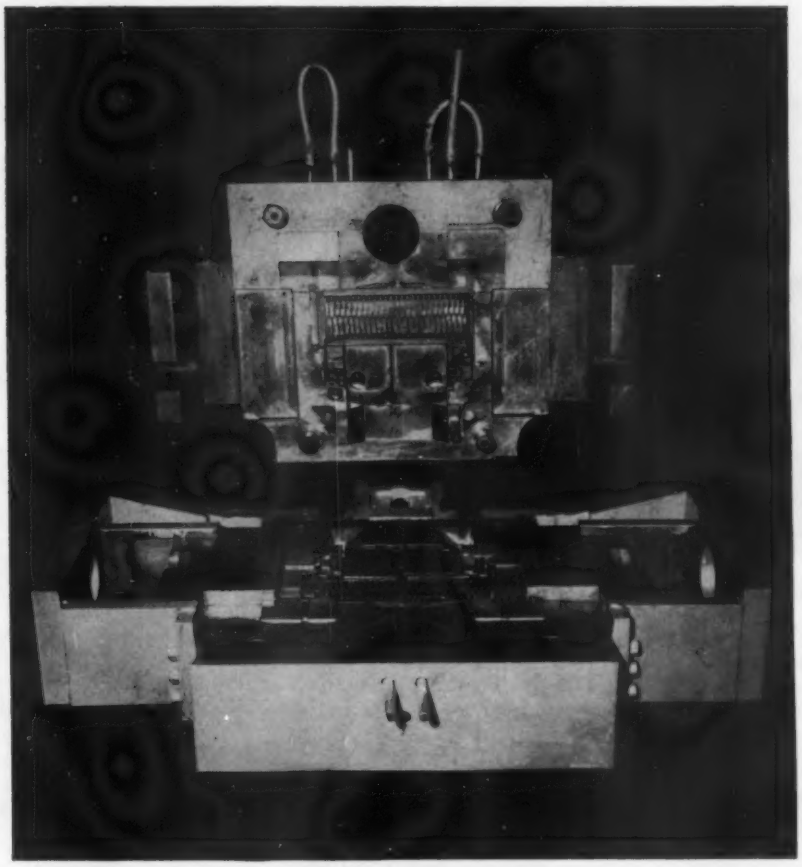
This large complex gimbal was cast to include many details on the internal and external surfaces.

Design problem?

Call your Austenal representative and ask him to show you how Microcast can help you.

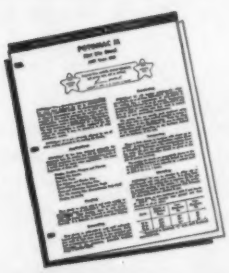
For more information circle No. 15 on the Reader Service Card

austenal INC.
microcast division
224 EAST 39th STREET, NEW YORK 16, N. Y.
7001 SOUTH CHICAGO AVE., CHICAGO 37, ILL.



No matter what your DIE-CASTING JOB may be...

Accuracy calls for POTOMAC M Hot Work Die Steel



Write for BLUE SHEET on POTOMAC M

This concise four-page folder gives all needed handling and shop treatment details on Potomac M. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

ADDRESS DEPT. PM-89

In the precision casting of aluminum, POTOMAC M Hot-Work Die Steel is especially favored as the material for die-casting dies because its properties help assure accuracy of the steel itself *after* heat treatment. Die makers have found that size changes are held to a minimum. Dimensional stability is thus the *first* contribution that POTOMAC M makes to accuracy.

Production accuracy of the die after it is in service is maintained also by the resistance of POTOMAC M to wear, to heat checking, and to metal wash.

Allegheny Ludlum makes a complete line of steels for hot-work tooling of various kinds—so, whether your need is the mass producing of duplicate parts or fabricating a few of them, call up or write "A-L" every time for hot-work counsel or service or both. Just tell us your requirements.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For nearest representative, consult Yellow Section of your telephone book.

For complete **MODERN** Tooling, call

Allegheny Ludlum

WSW 8285

AL® FINE TOOL STEELS SINCE 1854

For more information circle No. 7 on the Reader Service Card

CASTING ABOUT

& processes involving precision metal moldings
technical news of applications

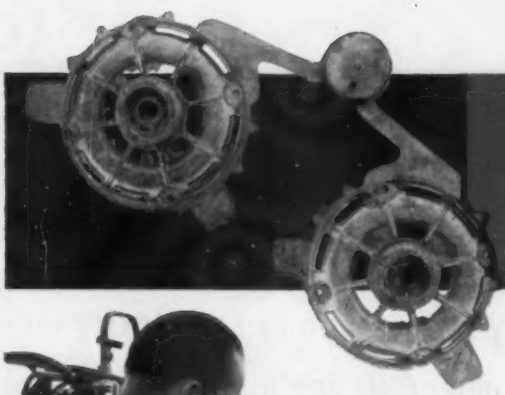
SHELL MOLD CAST SPROCKETS are being produced by the Ewart Foundry at Link-Belt Company in Indianapolis, Indiana. Shown above are the ejector station where the finished shell is removed from the pattern, the finished shells of a gated pattern, and the drag half of the mold immediately after shakeout. Note that the smooth surfaces of the shells produce sprocket castings which need no grinding to eliminate fins. The cored bore is so smooth and concentric that it is threaded directly without a pre-machining operation.

METAL POWDER USES IN THE SMALL PLANT is the subject of a new leaflet No. 47 available upon request from the field offices of the Small Business Administration. "Squeezing particles of metal powder together in a die under great pressure and then ejecting it results in a metal compact with strength roughly equal to that of a cube of sugar," the leaflet comments, "but by heating the compact in a special furnace a metal powder part is produced having the strength of a casting and capable of physicals equal to or better than metals produced by conventional means." The leaflet discusses some of the uses and advantages of metal powders.

ZINC SALES CLIMBED in January, according to latest Bureau of Mines reports, which shows shipments for that month only 8 percent below the all-time high of 97,800 tons. Of this increase over the previous month, sales to die casters showed an increase of 13 percent to 37,517 tons, and sales to galvanizers of 5 percent to 34,337 tons.

PRIMARY MAGNESIUM PRODUCTION set a peacetime record in February as it continued at capacity level, according to the Magnesium Association. In February, output was 6,399 tons, compared with 5,908 tons in 1956 and 4,646 in 1955.

TEN-POUND TURBINE ROTOR is investment cast of Stoody 1 metal using this expendable polystyrene pattern. The alloy is said to be extremely resistant to abrasion, and contains a high cobalt content, including tungsten and chromium. The rotor is cast to $\pm -.005$ with .025 grinding stock left on the diameter. Vital statistics: length, 11.125; small OD, 3.600; large OD, 4.300.



to die cast aluminum motor end-bells . . .

ABOVE: Operator removing end-bell casting from one of Emerson-Electric's new Model 400-N Clevelands. End-bell is 6¼" in dia. Weight of shot approx. 2½ lbs. A close-up view of the "as-cast" part is also shown.

BELOW: Cleveland Model 400-N with aluminum shot end. Also available as a hot chamber, zinc machine. Has 36"x40" die plates; 400-tons locking pressure, strain gage tested.

EMERSON-ELECTRIC AGAIN SELECTS MODEL 400-N

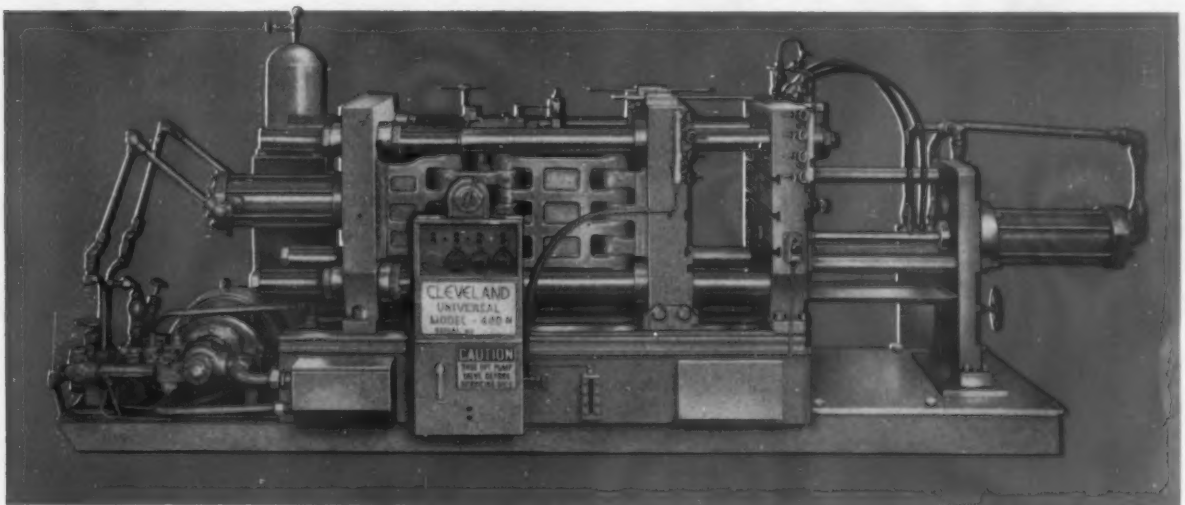
CLEVELANDS

The Emerson Electric Mfg. Co., manufacturer of Emerson-Electric motors and appliances, operates two Model 400-N Clevelands in their St. Louis plant, to cast aluminum motor end-bells.

Based on the excellent performance of these Clevelands, Emerson-Electric has recently installed *two more* Model 400-N Clevelands in their new, modern plant at Paragould, Ark. These new Clevelands are also producing aluminum end-bells in two-cavity dies.

For the Paragould installation, the new Model 400-N's were built as "right-hand" and "left-hand" machines; are located shot end-to-shot end. One operator controls both machines, ladling from a central furnace.

The nation's leading producers of die castings rely on *Clevelands* for dependable, profitable performance. Investigate their advantages for *your* production. Built in 50, 200, 400 and 600 ton capacities, for zinc and aluminum casting. For machine specifications, write for new Bulletin No. 5246.



THE CLEVELAND AUTOMATIC MACHINE COMPANY

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SALES OFFICES: CHICAGO
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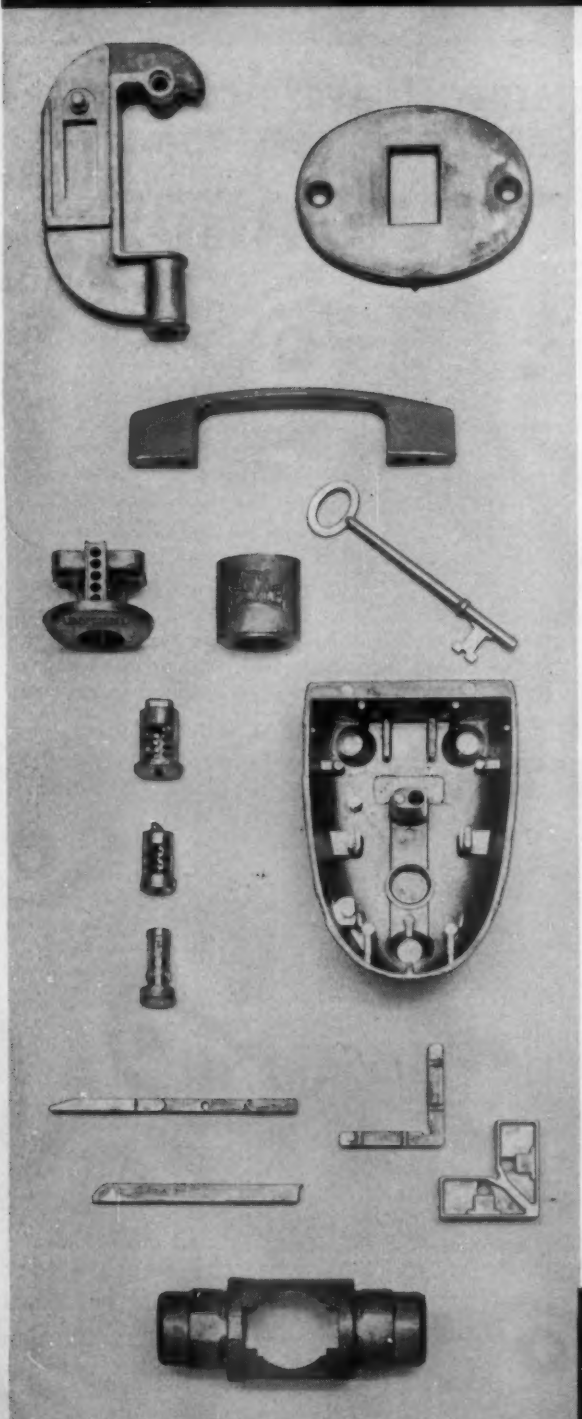
Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

For more information circle No. 26 on the Reader Service Card

HARDWARE PARTS



Any size, shape or complexity produced in one operation, at high speeds and low cost, by

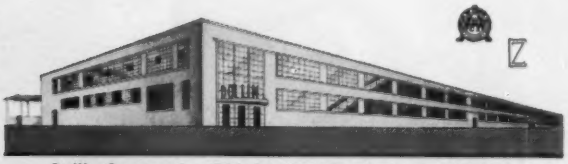
DOLLIN Advanced Die-Casting Techniques

•

Close tolerances--high impact and tensile strength--free machining --smooth finish--volume production

Vast experience available in the design, engineering and die-casting of all types of zinc and aluminum hardware parts. Over 25 years serving leading manufacturers of locks, tools, door sets, cabinet hardware, metal doors and sash, etc. Extensive, modern production facilities, including specially-designed high-speed automatic machines for small zinc castings.

Send prints or samples of any parts for cost-cutting suggestions and quotation. Engineering advice without obligation.



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DOLLIN Zinc & Aluminum DIE-CASTINGS

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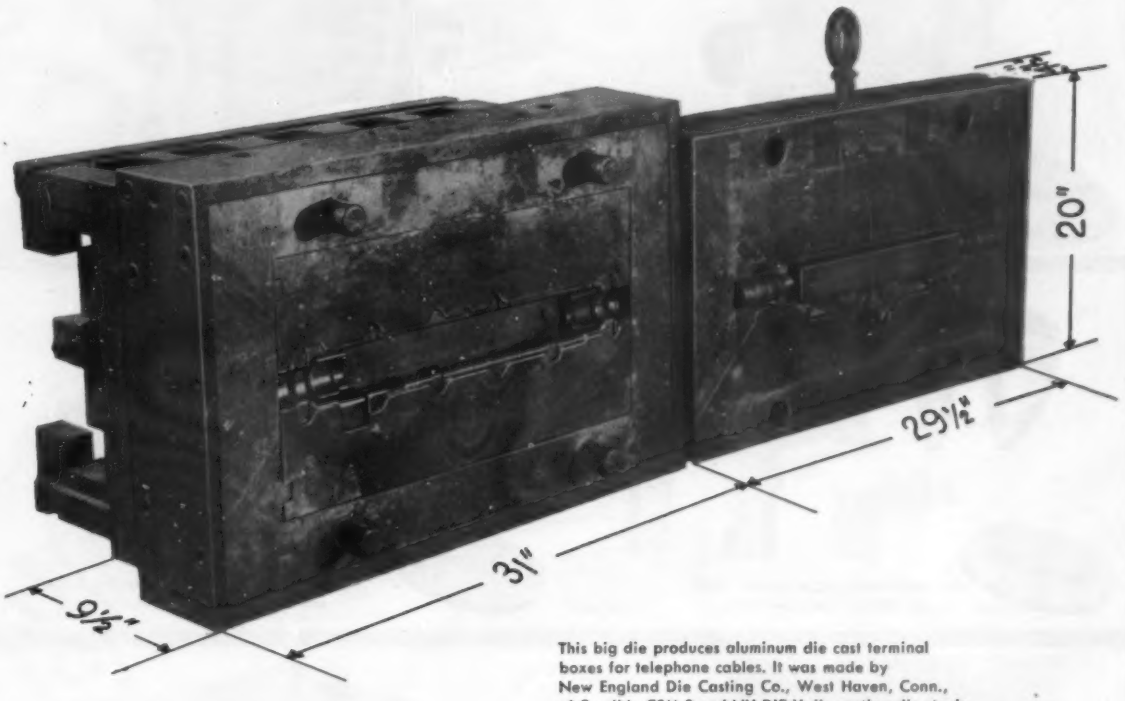
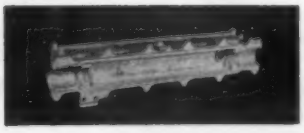


This big die produces aluminum die cast terminal boxes for telephone cables. It was made by New England Die Casting Co., West Haven, Conn., of Crucible CSM 2 and NU DIE V die casting die steels.

it's made of

ultrasonically inspected



CSM 2 and NU DIE V

...from Crucible warehouse stock

The die above, built by New England Die Casting Company, West Haven, Connecticut, casts aluminum electrical terminal boxes. The holder block is prehardened CSM 2 – the insert NU DIE V – both promptly obtained from local Crucible warehouse stocks.

Crucible CSM 2 and NU DIE V are made for and inspected to die casting steel quality. They're an unbeatable combination – perfect for holder blocks, solid dies, inserts or sleeves – for any die casting application.

What's more, delivery is from local warehouse stock – in 438 sizes – 1" to 40" wide . . . ¾" to 15" thick – all ultrasonically inspected. You just can't beat Crucible die steels for quality or availability. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

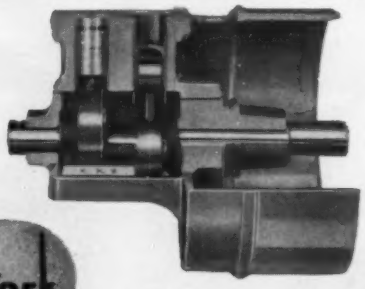
CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

For more information circle No. 29 on the Reader Service Card

Revere

. . . makes camera parts *light-tight* and *interchangeable*

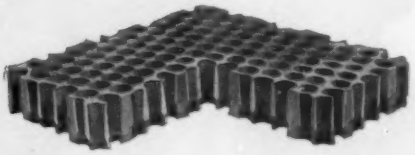


York

. . . combines motor and compressor into *one-piece* housing

Black & Decker

. . . cuts finishing of power tools to *one buffing* operation



E.W. Blatchford

. . . makes "Honeycomb" printing base in *only way* it could be done

Regina

. . . concentrates *weight where needed* in floor waxer

Sunbeam

. . . closely *matches section thicknesses* to strength requirements of appliances

A dozen blue-chip products Doehler-Jarvis die-

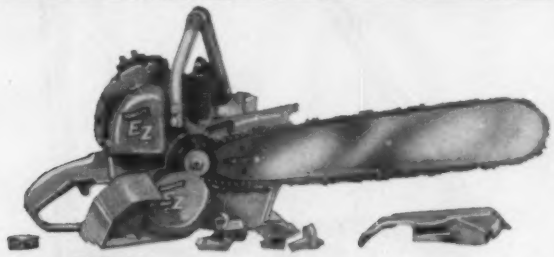
Each of these twelve products is outstanding in design.

One is extra light. Another is unique for precision. A third is remarkable for space economy. Each has a key feature that helps make it a success.

All these patterns of success are variations on a single theme . . . the skillful use of Doehler-Jarvis die castings to achieve design objectives.

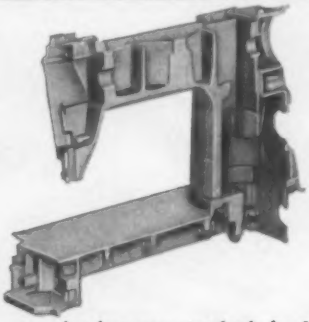
In each case, the manufacturer brought Doehler-Jarvis into the design picture at an early stage. Customer and D-J engineers worked out the specifics . . . the basic contours, the section, the coring, the ribbing, the ejection lugs, machining base points, finish . . . all the fine points.

Design results have been enviable. And frequently there have been important side benefits . . . metal saved, machining and assembly operations by-passed, finishing steps reduced, rejects prevented.



HOMELITE

... packs 5 horsepower into chain saw weighing *only 19 pounds*

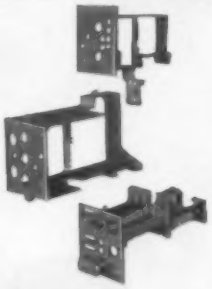


SINGER

... develops new standards for *3-dimensional* precision in sewing machine assemblies

Underwood

... replaces *six* typewriter frame castings with *one*

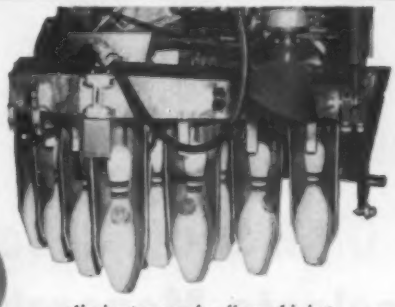


Western Electric

... makes *one* unit of space do the work of *six* in telephone terminal equipment

Sears Roebuck

... designs mower housing for *built-in assembly savings*



AMF

... *eliminates nearly all machining* in 99 pinspotter parts

illustrate a dozen ways castings improve product design

Take your cue from the makers of these successful products

If you're looking for ways to improve your product, lower its cost, or speed its production ... or if you're developing new devices ... do what the makers of the products shown above did. Call in Doehler-Jarvis.

We'll be glad to help you evaluate the possibilities for you in die castings.

Doehler-Jarvis

DIVISION OF NATIONAL LEAD COMPANY

General Offices: Toledo 1, Ohio

In Canada:

Barber Die Casting Co. Limited

Hamilton, Ontario

TRADE MARK

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5 YEAR WARRANTEE
Your Scotts Electric Mower is unconditionally guaranteed for 5 years. This guarantee is possible because of exceptional materials, engineering and workmanship.
O. M. SCOTT & SONS
Scotts
SCOTTS

O.M. Scott & Sons selects Monarch Permanent Mold Castings

for more casting value per dollar

In the words of O. M. Scott & Sons, famous for lawns, "We have been dreaming for 20 years of producing the perfect lawn mower. We have spent the last five years designing the Silent Scott®." The result is a new concept in lawn mowers, underwritten by their five year unconditional warrantee. Look for it at your neighborhood garden or hardware store.

Monarch Aluminum Velvaglaze® permanent mold castings are used for the 6 major parts of the assembly. The main reasons are strength, durability, performance and appearance. Monarch's ability to provide a "one-source", non-competitive analysis of all practical production casting methods contributed to the effectiveness of Scott's design. This same practical approach in your next development program can help you to obtain better end-products at lower factual end-costs.

The 6 major castings are Velvaglazed®—a natural lustrous aluminum, mar-resisting finish.

SINCE 1913
MONARCH
ALUMINUM
PIONEERS IN CASTING PROGRESS

®Silent Scott is a Trade Mark of O. M. Scott & Sons. ®Velvaglaze is a Trade Mark of

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MANUFACTURERS OF: *Aluminum Permanent Mold Castings • Zinc Die Castings • Aluminum Die Castings • Exclusive Velvaglaze Finishing • and Spectraglaze, colorful Porcelain Enamel on Aluminum Permanent Mold Castings.*

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FOR FOUNDRIES AND DIE CASTERS . . .

aluminum casting alloys

FOR STEEL MILLS . . .

deoxidizer aluminum shot, notched bar, shapes, granulated

is one of the nation's leading smelters of aluminum, supplies top quality alloys specifically engineered to your requirements. You know that you are getting the best that modern smelting techniques and scientific quality control can provide when you specify alloys by Alloys & Chemicals Manufacturing Company.

Do you have an alloy or casting problem? Let engineers solve it for you. They may well have the answers that will cut your costs and improve your castings. No obligation, of course.

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ALLOYS & CHEMICALS MANUFACTURING COMPANY, INC.

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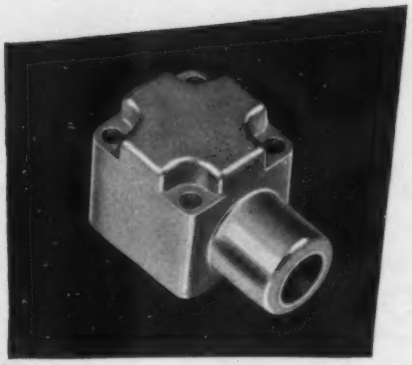
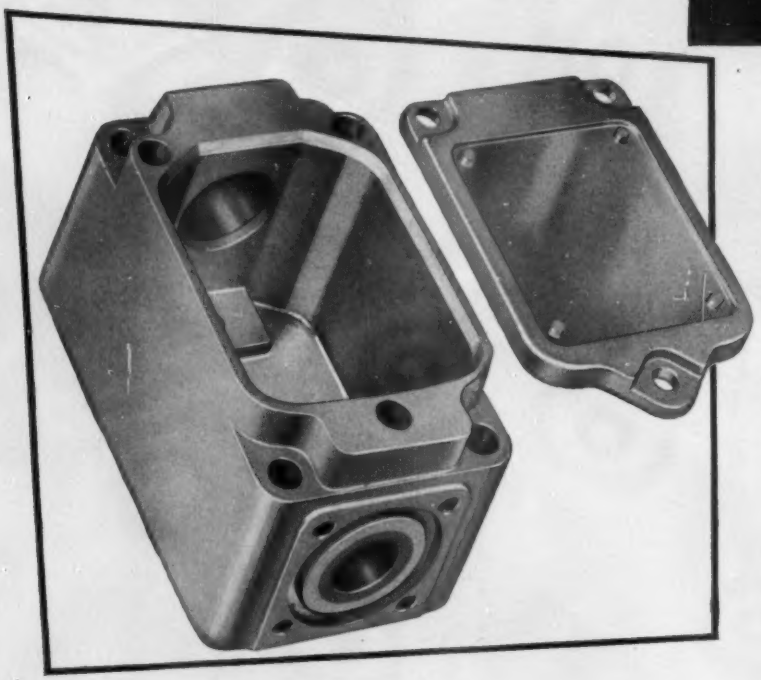
Telephone: ONtario 1-8600

The Rare Mechanical Skills Required Are Both Predominant and Seasoned



One of the Add-Ons for the main switch housing



Unusual switch parts—requiring seasoned mechanical skills for full process utilization.

at Madison-Kipp

for zinc and aluminum die castings

Full process utilization is the telling factor in the advanced die casting process. Outstanding and rare mechanical skills are required for best results.

Such skills at Madison-Kipp, from preliminary blue print analysis through die designing, die making and die casting have been helpful to highly placed product designers and engineers for over a quarter century.

Please clip this ad as a reminder to contact us when you have die casting requirements.

kipp

MADISON-KIPP CORPORATION
213 WAUBESA STREET • MADISON 10, WIS., U.S.A.

Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

For more information circle No. 60 on the Reader Service Card

60 CYCLE INDUCTION MELTING

Melting metals in the 60 cycle induction furnace will bring greater economy and quality to your melting and casting operations. Whether you produce zinc or aluminum die castings, brass or bronze castings, ductile iron castings, or aluminum extrusions — to name but a few fields — there is an induction furnace to do your job.

60 cycle induction melting will reduce metal losses to a minimum and eliminate metal contamination. Alloy composition is maintained uniformly, and metal temperature is closely controlled at all times. Operating conditions are ideal: worker fatigue is reduced significantly.

AJAX ENGINEERING CORPORATION has specialized in just this one field: building the best and most efficient 60 cycle induction melting furnace for the job. As pioneers of this melting principle we have accumulated considerable experience in each field of application.

AJAX induction furnaces have been instrumental in establishing new metallurgical processes such as continuous casting, continuous galvanizing, and aluminum coating of steel. Exclusive AJAX developments are the electromagnetic pump and the AJAXOMATIC for controlled pouring.

AJAX 60 cycle induction melting furnaces range in size from 20 kw to 2000 kw, produce from 150 pounds per hour up to 40 tons per hour.

MAY WE HAVE YOUR INQUIRY?

ajax

ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

For more information circle No. 6 on the Reader Service Card

RONSON produces the First Electric Shaver with 2 Separate Cutting Heads

Ronson calls their new "66" Shaver "the most revolutionary electric shaver ever designed"—and offers strong evidence to support this claim. For one thing, it is the first electric shaver with an *extra* cutting head, called "Super Trim", which does every trimming job, from sideburns to mustache.

When any manufacturer is out to break precedent, and still sell his product at a competitive price, he needs every bit of designing and production skill he can find—anywhere.

Ronson found these in generous abundance at Mt. Vernon. Three of the vital parts of the "66"—the head frame and the plate covering the "Super Trim" blades (zinc castings), and the motor chassis (an aluminum casting)—were designed to obtain the special advantages of die casting: thin wall sections of great strength and rigidity, negligible machining, smooth finish, high speed production, low cost.

Says Ronson: "These parts are highly vital to our electric shaver. The cutting mechanism depends on the head frame for its accuracy of mounting and rigidity while cutting. The chassis on which the motor is built is of course the heart of the shaver's power system, and a very accurate casting is necessary for the job."

These advantages, important to any manufacturer, stem directly from the way we are organized here at Mt. Vernon. We have both the facilities and the complete die casting service it takes to produce parts like these, in any quantity, at minimum cost. We have 200,000 square feet of the most modern equipment for making dies and for die casting aluminum and zinc. And Mt. Vernon service comprises completely coordinated designing, die-making, casting, and machining, all under one roof.

It will pay you well to bring your production specifications to us. We may show you, as we did Ronson, the way to important cost reductions and improved products.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT

SALES REPRESENTATIVES

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6 East 194th St., Cleveland, Ohio

Mr. Jerome J. Theobold
9 East Genesee St., Skaneateles, N. Y.

Mr. Arthur Diamond, Tools Incorporated
86 Bethlehem Pike, Philadelphia, Pa.

Mr. Anker Anderson
Cascade Road, Stamford, Connecticut

Mr. William Sauers
101 Briarcliff Road, Rochester, N. Y.

Mr. David H. King
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Mr. George E. Hahl
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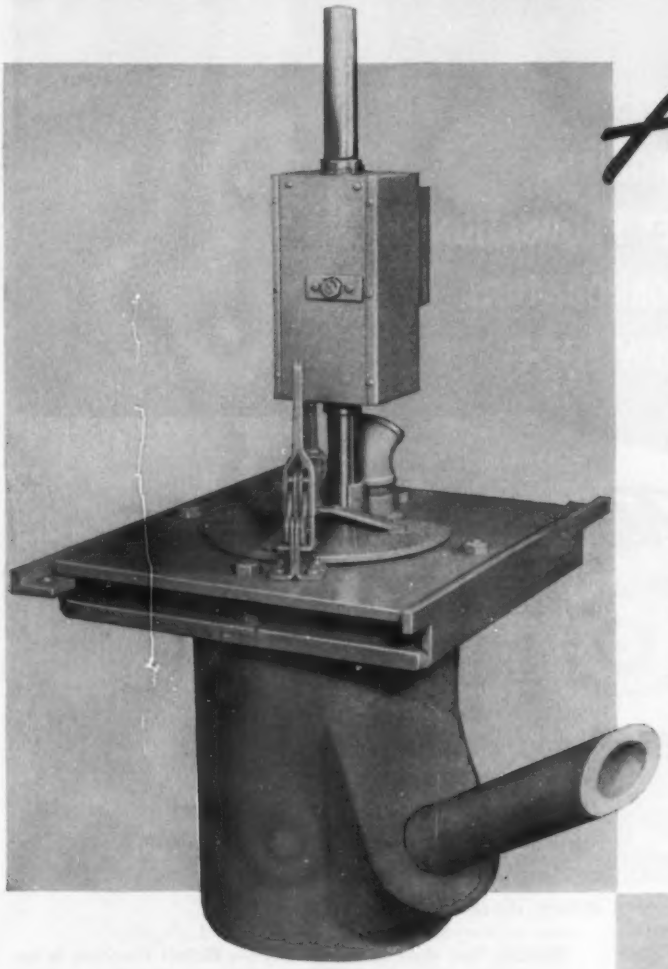
For more information circle No. 63 on the Reader Service Card

Automatic casting of Aluminum *now practical*

with *New* LINDBERG-FISHER

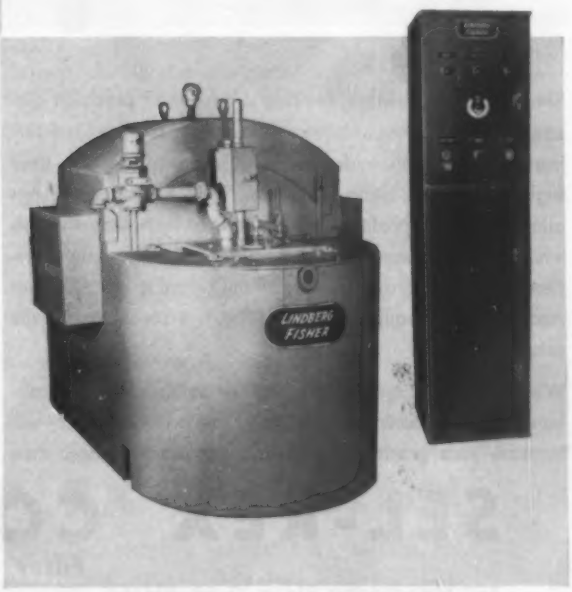
We call it "LITTLE JOE"

Autoladle



To the best of our knowledge the Autoladle is the first practical automatic aluminum ladling unit yet divised. Thoroughly tested and proven in service, the Autoladle is adaptable to induction, electric resistance or fuel fired reverberatory furnaces. In any installation it offers these advantages:

- Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- No interruption of the casting cycle during charging of metal.
- No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.

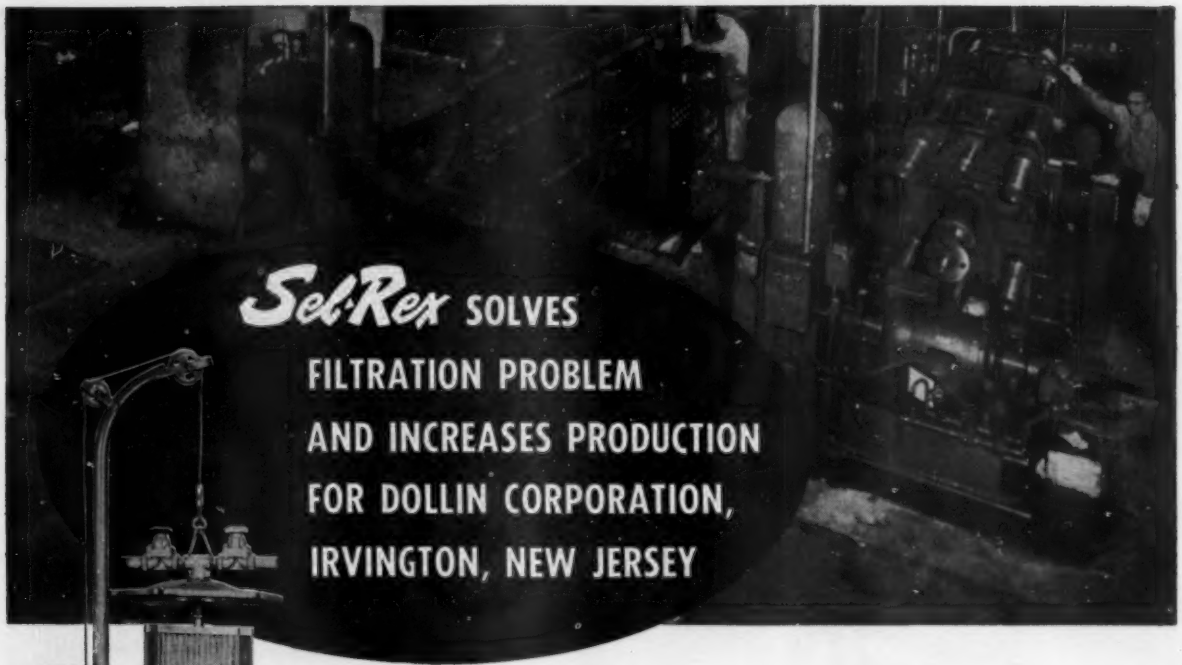


At the right, "Little Joe" is shown installed in a Lindberg-Fisher electric resistance aluminum holding furnace. With it is the panel cubicle and controls which is supplied completely assembled and wired. For complete information on the Autoladle get in touch with your nearest Lindberg Field Representative (See your classified phone book) or write us direct.

LINDBERG FISHER

A Division of Lindberg Engineering Company, 2463 West Hubbard Street, Chicago 12, Illinois

For more information circle No. 58 on the Reader Service Card



Sel-Rex SOLVES FILTRATION PROBLEM AND INCREASES PRODUCTION FOR DOLLIN CORPORATION, IRVINGTON, NEW JERSEY

"Best Filter on the Market..."

says Eric Reinhold
Chief Plant Engineer.

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Photos courtesy Whirlpool-Seeger Corporation St. Joseph, Michigan
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TAMING A "MONSTER" IN CAST STEEL

This stainless steel casting is an integral part of the after burner of a jet engine. The close-up illustrates the casting cut in half immediately after foundry production, before any machining.

WITH LEBANON'S CERAMICAST* PROCESS

THIS FLOW DIVIDER AND FUEL SELECTOR FOR A JET ENGINE was called the "monster" by its designers at the Cleveland Division of Parker Aircraft Company. Why? Because the dimensional requirements of its inner passages called for the most extreme quality control in the casting process.

Foundry engineers at Lebanon met the challenge, and selected the CERAMICAST Process as best suited because of the need for close tolerances, extreme smoothness in the internal passages, and the intricate coring.

During several months of development work, Lebanon engineered a special coring material to meet these requirements and developed special gauges for setting and holding the cores to meet the dimensional tolerances. Now in quantity production at Lebanon, this aircraft casting meets Class I X-ray inspection and operates under service conditions of high pressures and elevated temperatures.

LET US TAME YOUR "MONSTER" If your design project utilizes cast steel and requires a high degree of internal casting quality together with surface smoothness, close tolerances, and dimensional accuracy, CERAMICAST may provide definite quality and cost advantages. Let our engineers discuss the process with you and its applicability to your project. Write for CERAMICAST literature.

*CERAMICAST *is a registered trademark*

CIRCLE L

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CARBON, LOW ALLOY AND STAINLESS STEEL CASTINGS

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PMM LETTERS

the readers' forum

FINISHING DIE CASTINGS

We are manufacturers of door furniture, nameplates, automotive door handles, refrigerator hardware and similar zinc die castings. We are having difficulties because our customers are asking for a surface without any cracks and flaws and with a finish that can be chromium plated.

Our present finishing consists of the following operations:

1. Remove the flash with Carborundum strips.
2. Hand polish (bobbing, mopping and coloring).

We do not use barrel finishing because we cannot get the required degree of finish. The polished metal surface is then cleaned and degreased before plating. The plate is brass, nickel and bright chromium.

We believe that our process is not up to date especially regarding polishing. There must be a more modern and more economic process to get a bright and smooth finish without the necessity of the above polishing and buffing.

We should be very obliged if you would give us full information about the finishing processes used in the United States for these articles.

If possible please give us the names and addresses of firms who furnish special equipment— A.E., pres. (Sao Paulo, Spain.)

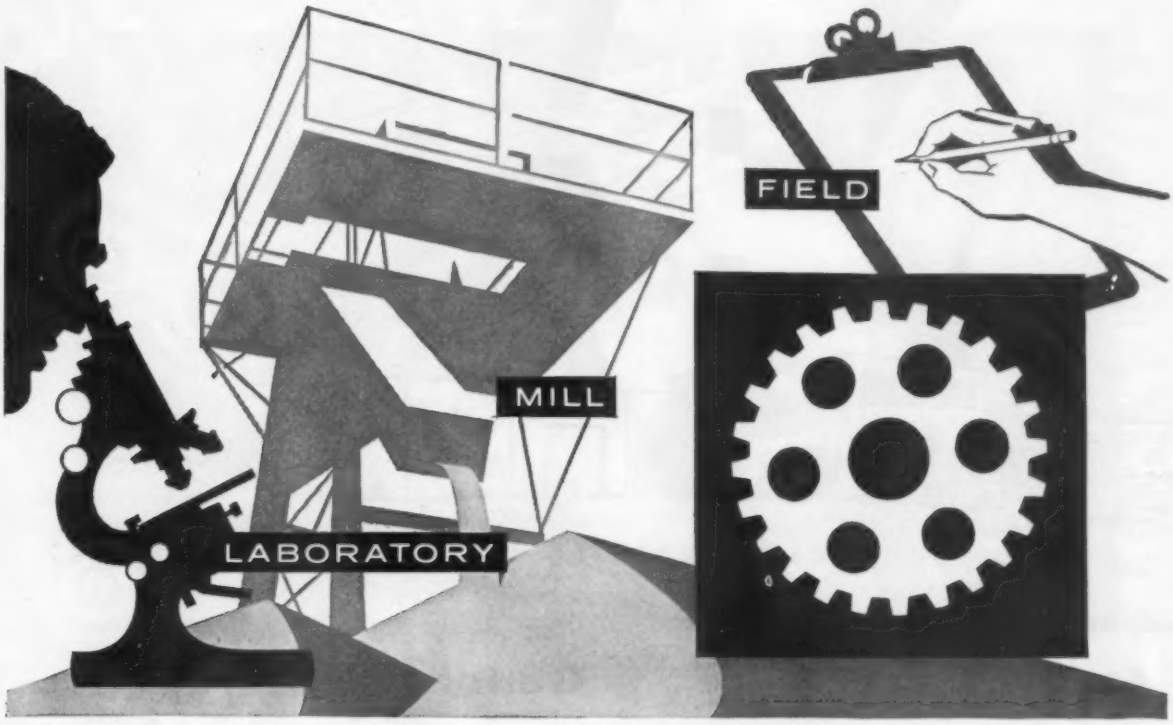
Descriptive information, names and addresses have been sent. —Ed.

HIGH STRENGTH STAINLESS

In reference to the article "New — A High Strength Stainless Alloy" which appears on pages 63, 87 and 88 of your March, 1957 issue, we believe your readers may have received several mistaken impressions from your presentation.

It is most unfortunate, for example, that your story fails to mention either Ohio State University or the Alloy Casting Institute. This new high strength cast stainless alloy, designated by the ACI as type CD-4MCu, was developed at Ohio State University as part of our continuing research program. A patent appli-

continued on page 71



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3-Step Metallurgical Service combines the experience and knowledge of Republic's Field, Mill and Laboratory Metallurgists with the skills of your own engineering and designing staffs. The objective of this service is to help you work out the solutions to problems you may encounter in the design and fabrication of iron powder parts.

The Republic Field Metallurgist studies the problem, right in your own plant. He talks to your designers and engineers, asks questions, finds out what you want iron powder to do. His report goes to the Republic Mill and Laboratory Metallurgists.

These three men discuss the report—pool their combined knowledge of iron powder and steel practice—check it against your problem. Their recommendation, based on solid data, is passed on to your engineers by the Republic Field Metallurgist. He stays on the job, works with your personnel to see that the problem is solved to your satisfaction.

The recommendations of these Republic specialists can help you determine iron powder's suitability to your parts design. Republic's new *Controlled Dimensional Factor* iron powders—Type "G" for growth, Type "N" for normal, Type "S" for shrinkage—can help you reduce fabricating costs and save on expensive die re-working.

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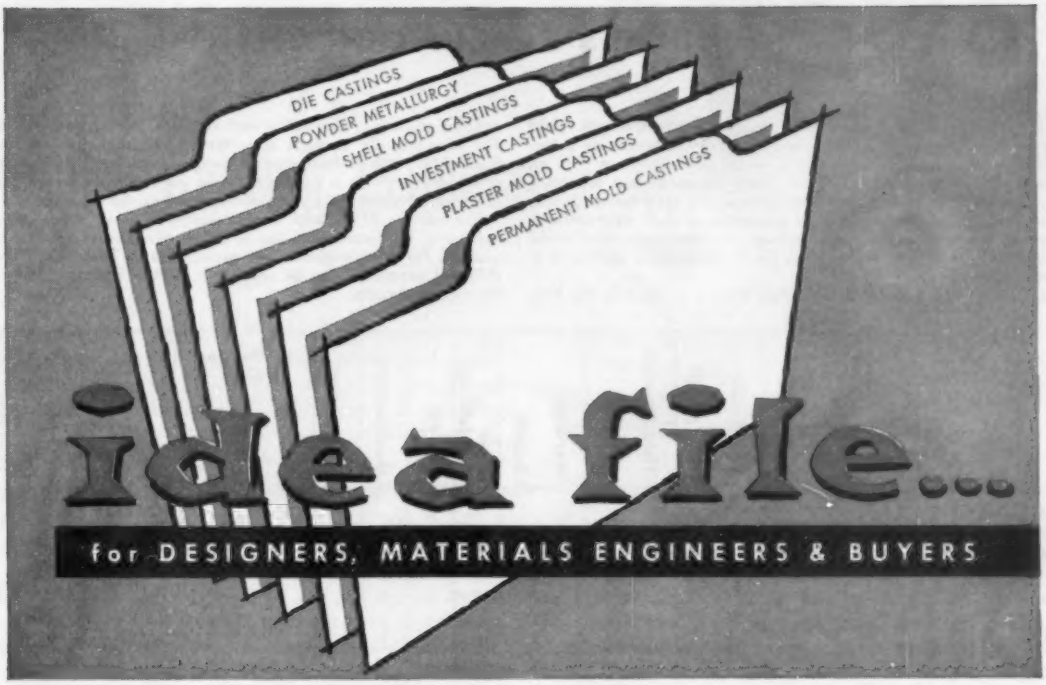


WHY does a designer specify a particular metal and method of fabrication? Basically there are only two reasons:

1. Physical and mechanical properties.
2. Final component costs.

In some cases, service requirements are so restrictive that little choice can be made. An example is parts that require the so-called super alloys as the material. Here, depending upon the alloy used, the manufacturing method is severely limited and, regardless of costs, it must be lived with.

Such cases are, fortunately, in the minority. By far the vast majority of fabricated parts allow the designer a sufficient lattitude so that, within the physical, mechanical and design limitations, there will exist a variety of fabricating methods.

Within this spread of properties and methods the most economical choice must be made and, to make an intelligent selection, both the designer and the production man must have more than a fragmentary knowledge of each possible method of manufacture. Such factors as the initial tooling costs, rates of production, time to get into production, the amount of machining that may be needed on a semi-finished product, how the particular material will respond to the required surface finishing, and many others will all influence the final decision. Above all else, the men charged with comparing the different metals and methods must always remember to make their analyses at the same level of completion so that a fabricating method is not choosen that seems to be the most economical and in final analysis is not. Nor should a method be rejected until it is clearly shown that its use would unnecessarily increase the cost of the final product.

Today, more than ever before, the "impossible" jobs are becoming routine. Advances constantly being made in high speed, low cost fabricating methods allow industry to produce products that only yesterday were so expensive to manufacture they could not find a market. It is because of these rapid advances in techniques and the introduction of new methods that almost all reference books and encyclopedias become out of date so rapidly.

WHY THIS IDEA FILE?

BECAUSE reference and text books become out of date so rapidly, the design and production men must rely on trade publications which specialize in the fields of interest. Through these media all of the newest advances are reported and both the usual and unusual applications described and illustrated.

It is, of course, not necessary that the exact application be described; rather, applications that show new properties, new configurations, or that illustrate new techniques are the most desirable. Such pictures and descriptions serve their greatest use when they suggest to the designer and production engineer that the part or parts under consideration might be made by a process previously not considered.

Naturally, only a very few large companies can afford to maintain a staff of value analysts who are, by both training and experience, capable of deciding what metal and which process should be used in all cases. The vast majority of the manufacturing concerns must rely on consultation with specialized fabricators to arrive at a decision.

In the following pages are illustrated, and briefly described, just a few of the many thousand applications of only six different precision molding processes for metals. It is hoped that these few ideas will suggest to the product designer either new or additional uses for parts made by the precision molding processes.

PMM PROCESS EVALUATION CHART

The values given in the above table for tensile strength, yield strength and hardness are minimum and maximum values as determined from test bars. Where only a single value is given it is an average for the particular material. These values do not represent those secured in a formed part and can only be used for guidance, not for final design. The mechanical properties of shell mold castings are about the same as for sand castings. In some cases, shell mold castings may be slightly higher than for a comparable casting in a green sand mold.

The general characteristics are rated from 1 to 10 with the best properties, lowest costs, thinnest sections, etc. being rated as 1. For example, die castings have the highest tooling costs, the best finishability, the highest production time and the fastest production rate. Surface finish is among the best, porosity rather high and show the highest potential for machining savings.

The ratings of general characteristics are, of course, somewhat arbitrary, but represent the average opinions of several reliable sources. For the designer these ratings are of importance since the different processes can be compared on the basis of other factors than quoted costs.

	Ult. Tensile Strength-psi	Yield Strength psi	Hardness Brinell	Heat Treatability	Tooling Cost	Machinability	Finishability	Production Time: Tooling	Production Time: Set-up	Production Time: Rate	Labor	Surface (unfinished)	Porosity	Section Thickness	Possible Machining Saving
DIE CASTING					10		1	10	10	1	2	1	5	1	1
	30,000	16,000	50												
Aluminum	45,000	27,000	80	5		5									
	29,000	20,000	60												
Magnesium	34,000	23,000	62	5		2									
	30,000		82												
Zinc	45,000		91			1									
INVESTMENT CASTING					8		4	5	2	6	6	3	3	2	2
	55,000	20,000	107												
Beryllium-Copper	170,000	150,000	372	1		1									
						1									
	Max		Max												
Bronze	85,000		185			3									
	20,000														
Aluminum	52,000		150	1		5									
	61,000	34,500	132												
Stainless Steel	200,000	184,000	375	8		7									
	88,000	63,000	88												
Tool Steel	187,000	181,000	550	1		4									
PERMANENT MOLD CASTING					7			3	2	3	3	3	2	2	2
	261,000	6,000	45												
Aluminum	48,000	40,000	140	2		5									
	27,700	21,600													
Magnesium	36,700	22,300		3		1									
PLASTER MOLD CASTING					1		6	1	1	10	5	1	2	10	3
	19,000	7,000													
Aluminum	40,000	32,000		2		5									
Brass				—		1									
POWDER METALLURGY					9		10	9	6	1	1	2	2 to 10	4	1
	15,000														
Brass	35,000					3									
	12,000		115												
Iron	200,000		650	5		3									
	14,000														
Nickel-Silver	42,000					2									
SHELL MOLD CASTING					2		8	2	5	4	4	5	6	6	5
Aluminum				3		5									
Magnesium				3		2									
Bronze	(About the same as green sand mold castings. May be a little higher)					3									
Cast Iron						10									
High Strength Cast Iron				5		9									
Stainless Steel				8		7									

The Die Casting Process

DIE casting is a one-step production process from molten metal to finished or nearly finished parts. Within the group of metals that can be die cast, there is no other method that will produce parts as rapidly, at as low a labor cost and as nearly completed.

WHAT METALS CAN BE CAST?

Relatively few alloys can be die cast. Zinc, aluminum, magnesium and some brass account for almost all of the die castings being made and of these, by far the greatest tonnage are in zinc and aluminum. Magnesium is often used interchangeably with aluminum, depending upon existing market prices of the metals. Some lead and tin are cast as are some of the more complex, low melting point alloys, but this group is extremely small.

While some brass is die cast, the parts made are generally quite costly due to the very short die life when these high melting point alloys are employed.

WHAT ARE TOOLING COSTS?

Die casting dies are expensive, they rank among the highest cost tooling for any manufacturing operation based on the same or comparable parts. Dies for zinc are the least costly, particularly if a "hardware finish" is not required. For average zinc die castings where a so-called commercial surface finish is adequate, low carbon, unhardened steel dies are often used with a consequent reduction in tooling costs. The high cost of die casting tooling is one of the reasons why this fabricating process is often uneconomical for short runs.

WHAT IS THE LEAD TIME?

For the very simplest castings lead time may be as low as five or six weeks. Generally, however, it is considerably more than this and for the more complicated castings may run up to twenty weeks or more. These lead times are for delivery of the first sample castings, if changes must be made after sample delivery the time for actual production can not even be estimated.

Dimensional accuracy requirements can be a very determining factor in both die costs and lead time. Where tight tolerances are required both of these factors will be materially increased. In many cases, lead time and die costs can be cut sharply by opening tolerances a small amount.

Surface finish requirements can be a determining factor in both costs and lead times. Unnecessarily strict requirements as to finish can multiply die costs with associated increase in time required for die manufacture.

WHAT IS THE ACCURACY?

Generally dimensional tolerances of ± 0.005 in./in. can be held. Most foundries prefer tolerances in the order of ± 0.007 in./in. when ever possible, but the closer accuracy can be held without any appreciable cost penalty.

When closer tolerances are required, die costs and piece costs go up. For example, ± 0.003 in./in. can be held, at a price, provided the dimension does not cross a die parting line. Any closer tolerances are only possible on a few selected dimensions within a solid portion of the die and generally on dimensions under 1 in. total length.

Surface finish requirements fall in the same class as dimensional accuracy. If a standard commercial finish is acceptable the die costs and piece costs will be considerably lower than when a "hardware finish" is specified.

WHAT ARE THE ADVANTAGES?

Since the die casting operation is almost fully automatic, and since the rate of production is high (up to 300 shots per hour), the direct labor charges are low. Properly designed, a die casting will eliminate practically all machine work except for such low cost operations as drilling, tapping, surfacing and perhaps reaming. By the expenditure of some-what greater amounts on tooling the surface finishing costs can be materially cut.

The accuracy of duplication from piece to piece is exceptionally high in die casting so that inspection costs are decreased.

Again by proper design, assembly can be faster since lugs, bosses, pins, etc. that accommodate high speed fastening devices can be cast-in. Inserts of all sorts can be cast in and either self tapping screws or self-tapping threaded inserts may be utilized.

WHAT ARE THE LIMITATIONS?

There are two major limitations to the die casting process. The first is that the process is essentially a mass production one and requires that for the most economical production the individual run of castings be long. Only those cases where large amounts are saved by the elimination of machining can short runs be made. The second major limitation is in the metals that can be cast. When and if new die steels are developed, this limitation may be lessened or eliminated.

idea file...

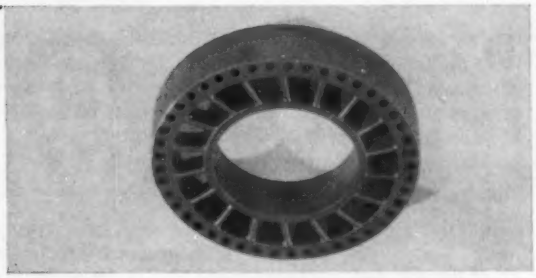
BALANCE WHEEL

. . . casting of an aircraft generator. The most advantageous effect of producing these balance wheels by means of the die casting process is to give a precision part which needs little machining.

Due to the nature of various other casting methods, close tolerances are not secured.

Die casting results in a casting which has a high accuracy.

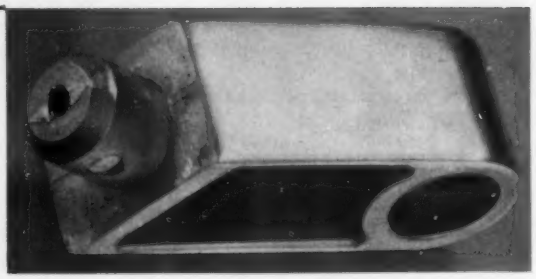
(Die casting; Eclipse-Pioneer)



DOOR HANDLE

. . . post now die cast in aluminum. Once produced as a cast iron part, the door handle was re-designed as a die cast part. This eliminated the following problems.

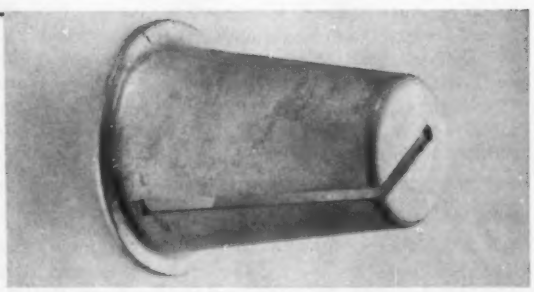
First was the high cost of surface-finishing the cast iron. This included an all-over grind before paint could be applied. If a plated finish was desired, an all-over grind was necessary, then buffing and polishing operations before the chromium could be plated.



DUST COVER

. . . die casting. This seemingly uncomplicated part was once a problem in machining and assembly which sent its total manufacturing cost above the profit-making level. The casting, seen at right as it is produced in one piece by the precision process, replaces a sheet metal job which required use of many sheet metal working tools. Deep drawing of the part was necessary, not once, but three times before completion.

(Die casting; ZYX Die Casting Co.)

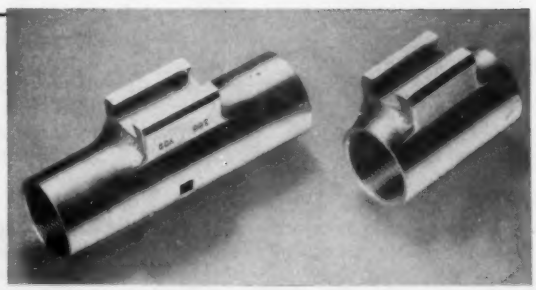


GUNSIGHT

. . . for target rifles. This die cast aluminum sight is an excellent example of economic gains based on a designer's ingenuity. The two castings seen at right are cast complete. Only finishing operations needed before assembly are the dove-tailing and threading.

Another outstanding characteristic of the die-design is that it casts these parts in a single length. This allows the same casting to be used for all sizes. Only changes necessary is shortening of the part to size.

(Die Casting; Alcoa)



HANDSAW

. . . parts are reduced to a minimum number because of the complexity of shapes possible in the die casting process. Several small parts have been united into one large piece by the designer. These larger pieces have thus become sub-assemblies of the handsaw.

Tolerances are such that perfect fits are assured without extensive machining operations. Critical dimensions for such things as bearing-seats are obtained by simple metal-removal operations.

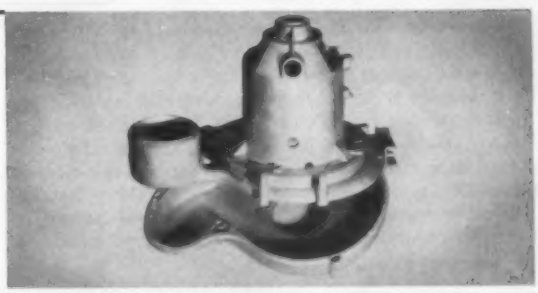
(Die castings; American Die Casting Institute)

HOUSING

. . . for vacuum cleaner motor is a complex die casting with difficult contours in which a slide core and good die positioning are required. The part is cast with 20 cored holes and slots.

In order to provide peak efficiency in operation, a groove which gives the vacuum seal, is cast in the cover plate of the fan-case. A saving of 50% in polishing costs, and 10% in machining costs was achieved by using die castings.

(Die castings; Precision Casting Co., Inc.)

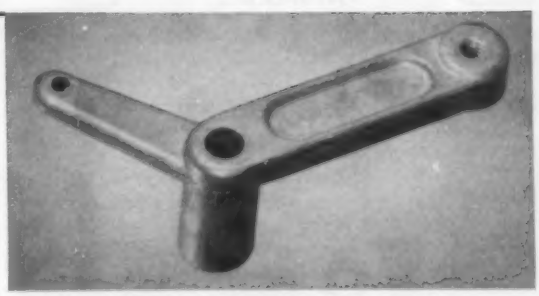


IDLER ARM

. . . for use in power operated mowers. An aluminum die casting, the part is important in the operation of the machine. It transmits the motion of the hand-clutch, tightening or loosening the drive-belt.

This part is an original casting, having been specified as such by the designer of the machine. It arrives from the foundry and is used "as is" with no machining or finishing operations.

(Die casting; The Hamilton Die Casting Corp.)



LATTICE

. . . connectors for use in chemical laboratories. The zinc die casting, seen at right, is the product of a designer who took advantage of the precision casting process.

At one time, rods had to be threaded through the connectors which were provided with holes for that purpose. They were heavy and often bulky.

By making the units as zinc die castings, machining costs were minor.

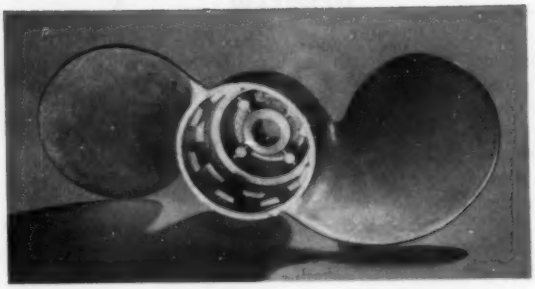
(Die casting; Acro Industries)

OUTBOARD BLADE

. . . with precision fitting. Once cast in bronze in order to be corrosion resistant, this outboard motor blade is now cast in aluminum, thus making it corrosive resistant, even in salt water. The precision casting process does away with all grinding, polishing, and other finishing operations.

Other advantage gained through use of precision casting process is the elimination of the balancing operation. Because of the close tolerances allowed in die casting, there is no need to balance the part.

(Light Metals Division, Thompson Products)



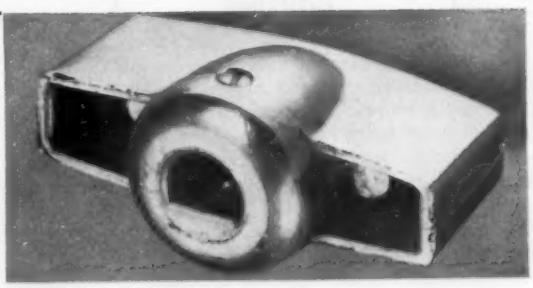
OVEN

. . . valve handle for use on appliances. This part was formerly made in a plastic and used on the oven. Disadvantages were apparent because the plastic gradually softened from the constant heat.

Ultimately it failed and had to be replaced.

Now re-designed so as to be manufactured by the precision casting processes, the piece is die-cast in aluminum and used as an improved valve handle.

Results have shown that after a long period of time, the aluminum, precision cast valve handle is far superior to the plastic part.



PNEUMATIC

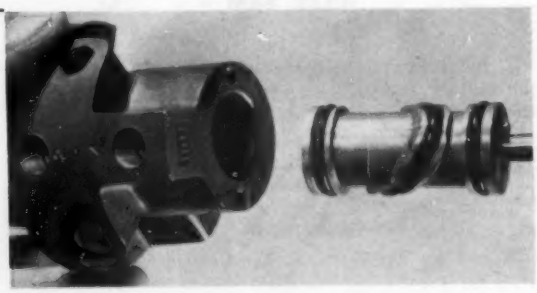
. . . switch housing. This part, redesigned as a zinc die casting, was formerly made in brass.

A cost saving resulted when zinc was used. The metal permitted a fairly complex shape to be made. This was also accomplished with a minimum of machining operations.

Because the designer specified the metal used at present, it is now possible to manufacture a switch with an improved design.

This is achieved by careful specifications.

(Die casting; Minneapolis-Honeywell Regulator Co.)



PULLEY

. . . suspended from idler arm and actuated by a hand clutch lever of a power-mower.

An aluminum die casting, this idler pulley rotates at a high speed and under a heavy load. For this reason, the casting is cored so that it will accept a double-seal ball bearing. The cored hole is reamed and the bearing pressed in after the previously specified interference fit is attained.

In order to cut die costs, the designer engineered the die so that un-flanged pulleys are cast.

(Die casting; Paramount Die Casting Co.)

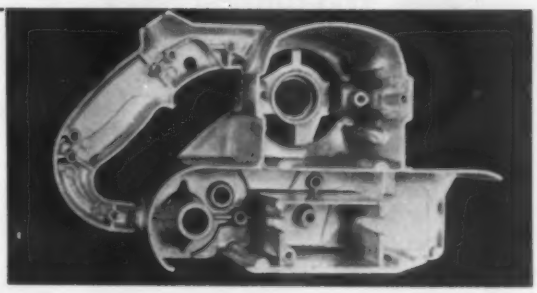
SANDER

. . . housing die cast in aluminum. This casting protects a power belt sander acting as a combination motor-housing, and belt-frame. Thin walls separate each of the sections which contains motor, bearings, gearing, switches, drive linkage, and wiring.

Expensive machining operations and assembly costs are eliminated by using this die casting aluminum alloy. The part's appearance is enhanced due to streamlined design permitted in die castings.

The surface needs only minimum polishing.

(Die casting; Porter-Cable)



STATOR HOUSING

. . . end-bell used in certain types of electric motors is a magnesium die-casting.

By specifying the use of magnesium in the casting, designers not only saved a great deal by avoiding much of the final machining costs, but won an added bonus of reduced costs in shipping charges as well.

By using the light-weight metal, total weight of the casting was cut 50%. This was responsible for a cut in freight charges for the manufacturer who sends these motors all over the world.

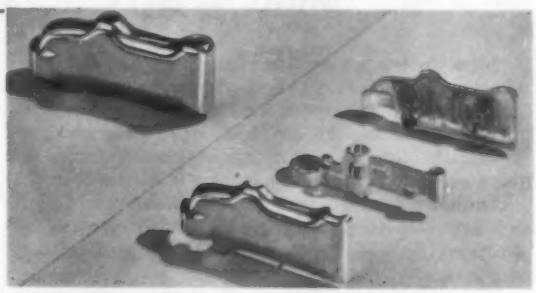
(Die castings; Dow Chemical Co.)

TESTER

. . . used to check hardness is a good example of mass produced precision part. The three zinc die-cast components at lower right meet in perfect mating when assembled, upper left. The precision matching of both cover-halves is important. It simplifies the polishing operation nearly always scheduled before plating.

Another advantage easily noted is the unusual contour the designer has specified in these castings. This example of up-to-date "human" engineering makes the instrument fit in its user's hand.

(Die castings; American Die Casting Institute)

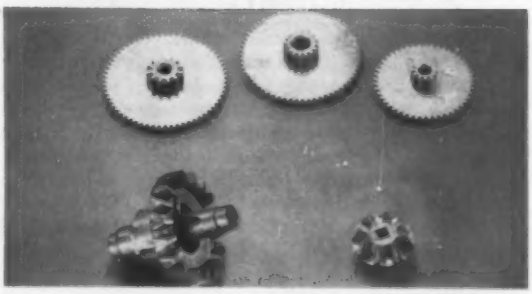


TOY MOTOR

. . . for a child's merry-go-round turns on this bevel-gear and spring drum at lower left. Zinc die castings, they would become costly three-part assemblies if produced by conventional means. Bevel pinion, lower right, would have been the cause of an expensive scrap loss if machined.

This zinc, die cast piece meets design specifications at reduced costs. First, second, and third drive gears, upper left to right, would have been much too costly as stamped, machined, pinioned, and assembled parts.

(Die castings; Gries Reproducer Corp.)



idea file...

DIE CASTINGS

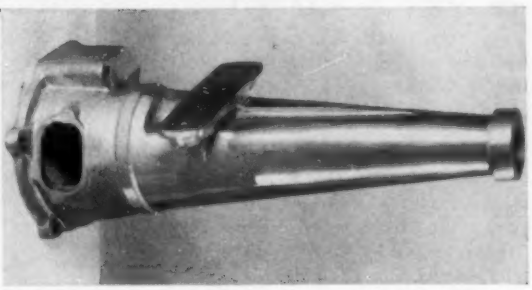
TRANSMISSION

. . . extension die cast in aluminum. This part is approximately one-third the weight of the piece formerly made by other means.

It is 20 inches long and weighs 7.7 lbs.

A fine example of a functional die casting, this precision cast transmission extension has such advantages as lower cost, and resistance to corrosion.

(Die Casting; Precision Castings Co.)



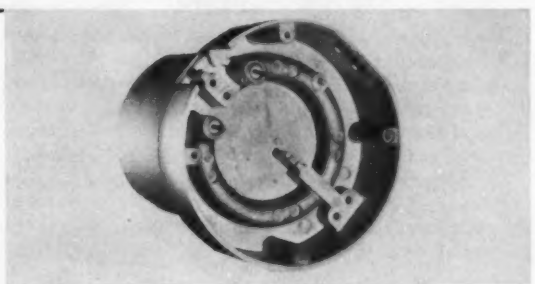
WARMER

. . . for baby bottles. This die casting is the base of a baby bottle warmer. It is an original part, specified by the designer as the best for integration into the warmer. This part, at right, holds the heating element, operating switch, and the handles.

Reason for selection by the designer is the necessity for even dissipation of heat by a part which is heavy enough to serve as a satisfactory base.

Holes are finished by the manufacturer.

(Die casting; Sunbeam Corp.)



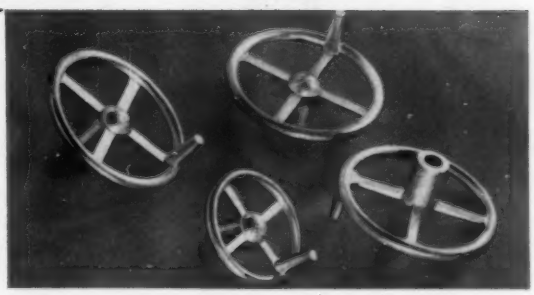
WHEELS

. . . of a unique series. Standard hand wheels, winch wheels, and steering wheels have been developed for production by the precision die casting process.

These wheels, seen at right, have been designed specifically for toys, appliances, power tools, and items produced by the electronics industries.

Trunion pins, hub lengths, hub diameters, shapes, and hole diameters can be varied to fit various applications. This is due to the broad design flexibility.

(Die casting; Gries Corp.)



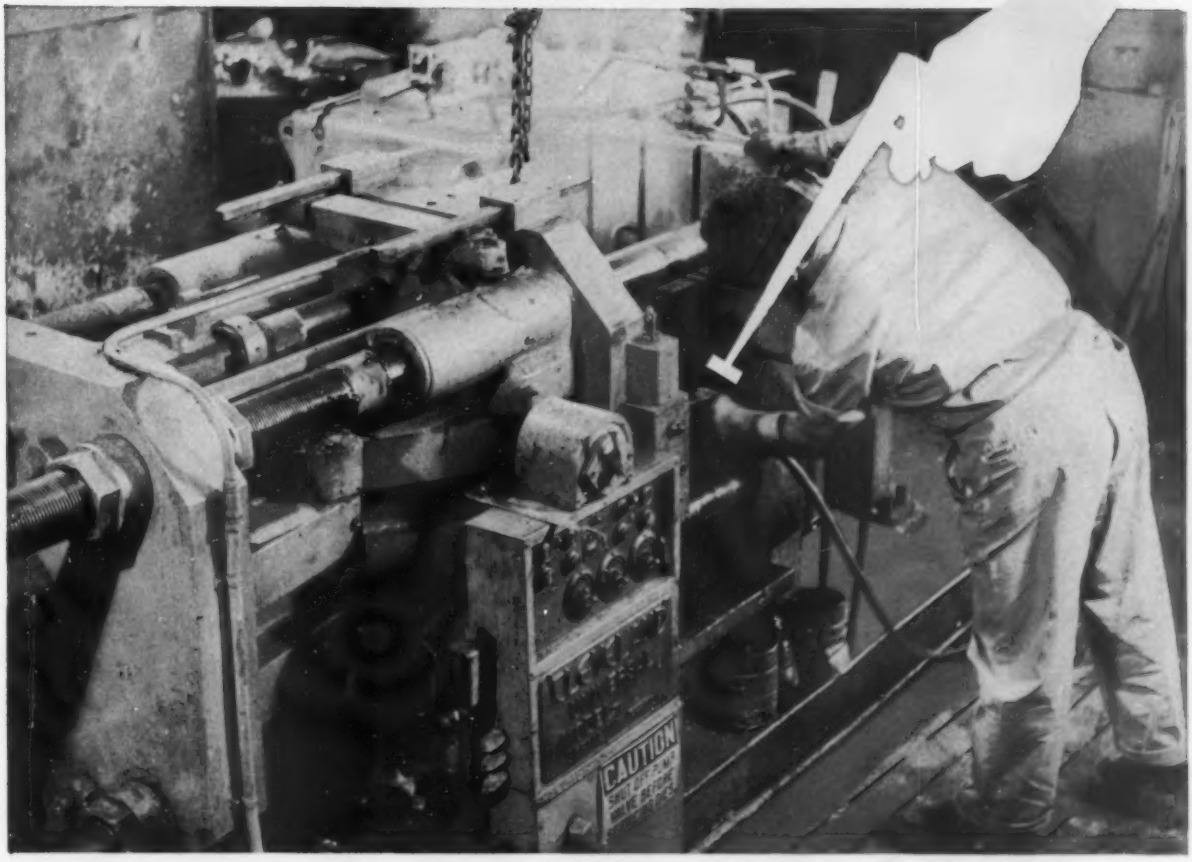
UMBRELLA

. . . tips and ferrules die cast in zinc, offer the fashion designer almost unlimited variation in style. Formerly made on a screw machine or molded in plastic, umbrella tips, at right, were costly because of high scrap loss and expensive machining operations. Plastic parts were inherently weaker than breakage-resistance die-cast parts. Umbrella ferrules, at left, were once made on a screw machine.

Now die-cast in zinc, they have a vast amount of design flexibility.

(Die castings; Gries Reproducer Corp.)

A Touch here does so much



HEAT AND PRESSURE...

Conventional lubricants burn up at 400°F. So what happens when aluminum and magnesium are die cast at 1300°F.? What happens to die surfaces subjected to the scrubbing effect of 30,000 p.s.i. pressure?

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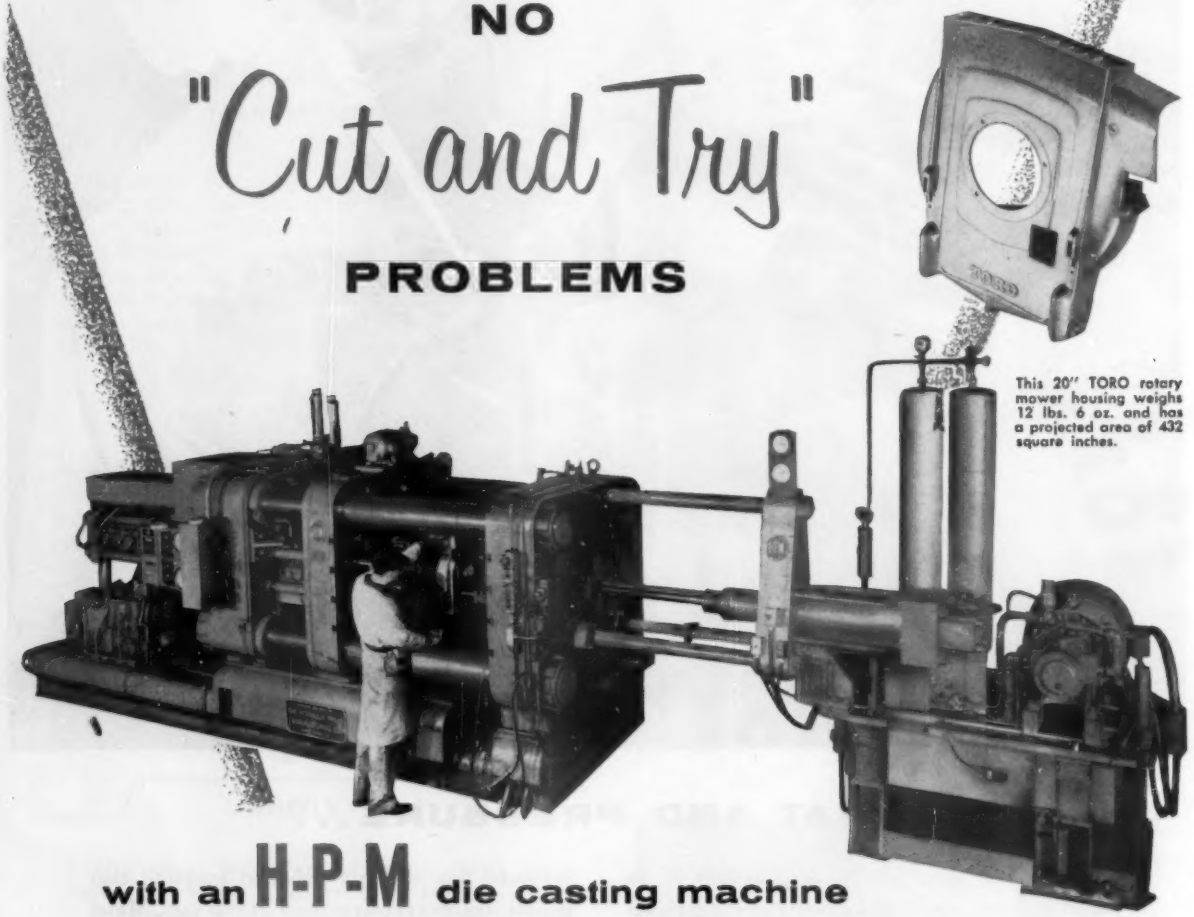

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The Permanent Mold Casting Process

PERMANENT mold casting may be considered as a first cousin to die casting. Both processes utilize metal molds, or dies, and both are used almost exclusively for the low temperature melting point metals. In the case of permanent mold casting, however, by far the largest tonnage of metal cast is aluminum.

WHAT METALS CAN BE CAST?

Permanent molds can be used for casting any of the non-ferrous metals and some cast iron is also cast. Because the metal is gravity poured, there is much less erosion of the mold and this single factor allows the casting of metals having a higher melting point than is the case in die casting.

In spite of the greater latitude allowed by the slower rate of pouring, by far the greatest tonnage of metal cast is aluminum. Magnesium and brass are probably in second place followed by cast iron. Some zinc base alloys are cast in permanent molds, but most of these castings are the so-called slush castings that are characterized by being hollow. Some silver, particularly knife handles, is also cast in permanent molds.

WHAT ARE TOOLING COSTS?

Tooling costs may be considered as median for the several processes under consideration. Generally the molds are made of a fine grained alloy cast iron, many of Meehanite. The cast molds are then ground and polished. Because high pressures are not involved and high rates of production are not possible the mold material is not as critical as in the case of die casting dies. Cores and slides can be pulled by hand or with simple mechanical means. All of these factors contribute to lower tooling costs.

WHAT IS THE LEAD TIME?

Lead time is considerably shorter for this casting method than for die or investment casting. Even highly complex molds may be ready for production within a relatively few weeks. In some cases as much as three or four months must be allowed, but such cases are the exception rather than the rule.

Another factor that shortens lead time is the lesser amount of mold modification that is required. A well versed foundry can generally design a mold that will work satisfactorily with only minor modification.

When a repeat order goes into production there is very little time lag. Provided the proper alloy is being melted, the time to get into production with an existing mold is very short. Generally all that is required is to bring the mold out of storage, degrease if necessary and heat to the casting temperature.

WHAT IS THE ACCURACY?

Within a mold half, particularly when casting either magnesium or aluminum tolerances of ± 0.005 in./in. can be maintained. Across a mold parting at least ± 0.010 or greater should be allowed.

Where metal cores are employed, normal tolerances of ± 0.005 can be held, but when non-metallic cores are used considerably greater tolerances are required. This latter requirement will vary from foundry to foundry and only consultation with the vendor can establish a minimum.

Surface accuracy and finish is not as good as either die casting or investment casting and on parts that are to be plated considerable polishing and buffing may be required.

WHAT ARE THE ADVANTAGES?

Permanent mold casting is well adapted for either short or long runs. The metal structure is almost always superior to commercial quality of die castings. Where pressure tightness is a factor many designers specify permanent mold castings. In those cases where a very considerable amount of machining must be done and the chilled surface is cut away, it is rare to uncover porosity in a properly made permanent mold casting.

This casting method is highly versatile as far as coring is concerned. Rigid metal cores, sand cores, or plaster cores can all be used. More recently shell cores are coming into use because of their superior accuracy.

With properly designed and made molds, almost all expensive machining operations can be either eliminated or minimized. Where machinng must be done, far less stock must be allowed than is the case with sand casting.

WHAT ARE THE LIMITATIONS?

Permanent mold casting has fewer limitations than any of the precision casting methods. Probably the most serious one is the inability to cast the high melting point metals. Size offers no real problem since castings weighing several hundred pounds have been made.

While not as precise as some of the other processes the savings in machining, surface finishing, stocking, inventories and inspection are still most impressive.

idea file...

ACTUATOR

. . . made of aluminum. Precision cast in a permanent mold, it is seen at right in "as cast" condition.

This part has been specified as a permanent mold casting to make its production economical and dependable. By using the permanent mold casting method, the designer gave this part added strength and density. He also gave it a quality of closely held precision-tolerance which eliminates much of the would-be waste material.

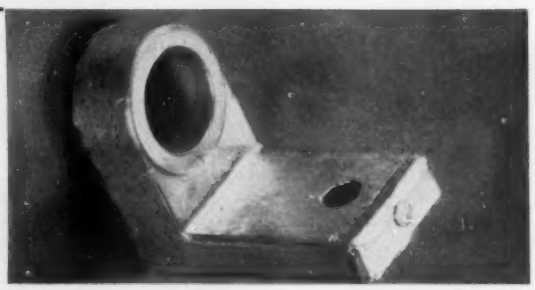
(Permanent mold casting; Thompson Products)

BATTERY CLAMP

. . . for storage batteries. Because of the rate of production of these batteries, the use of the permanent mold casting process is more desirable from an economic standpoint, than any other precision casting method. The battery clamp, seen at right, is used as is. No machining or final finishing is necessary.

If the precision casting process were not used, these clamps would need at least two manufacturing operations to complete them. One would be punching, another a bending operation.

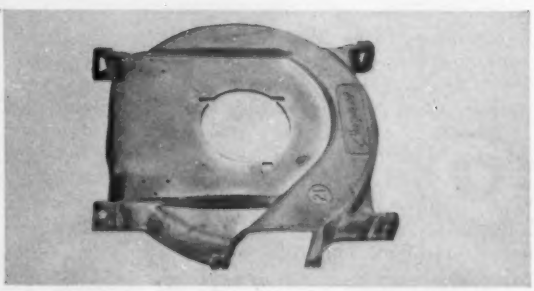
(Permanent mold casting; The Exide Battery Co.)



HOUSING

. . . for lawn mower cast in aluminum. The size of this casting, coupled with the necessity of pulling side cores, would have made tooling much to expensive if the part were not cast in a permanent mold. Since production over a period of years could not be anticipated, tool amortization had to be short. As a sand casting, over-all machining would have been required and the necessary lettering would have been indistinct. By using a permanent mold casting, costs are kept low.

(Permanent Mold Casting; Reliable Casting Corp.)



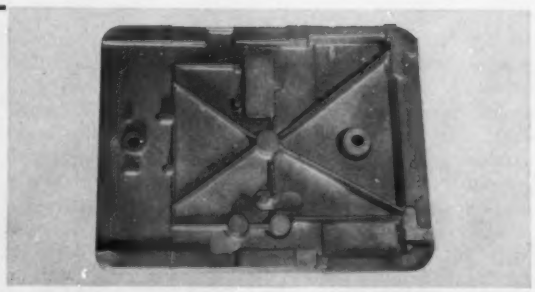
CALCULATOR

. . . base for business office appliance use. This is a permanent mold casting of a specific aluminum alloy chosen for light-weight and ease of handling.

Since converting to permanent mold casting processes, the weight has been sharply reduced from a high of 40 lbs. to a low of 10 lbs. Part of this weight reduction is due to the fact that permanent mold casting permits more precise, accurate dimensions.

Machining costs of the base have been cut 75%.

(Permanent mold casting; Eastern Casting Corp.)



CONNECTING

. . . rod for air compressor. These castings are a vital part of the functioning air compressor.

Because of the large quantities manufactured, it is permissible to design the permanent mold and its equipment so that the cost, per part, is favorably comparable to parts made by other processes.

There are other advantages. Among these is the greater ductility and direct bearing application.

(Permanent mold castings; Eastern Casting Co.)

FLOOR POLISHER

. . . housing. The high ratio of strength to weight of permanent mold-cast parts makes the process particularly useful in manufacture of these housings.

The close dimensional accuracy of the aluminum, permanent mold floor polisher casting also reduces weight and permits many machining economies.

The finish is seen in its "as cast" state. This surface provides the casting with one which resists marring and other damage. It gives the casting a natural luster.

(Permanent mold casting; Monarch Aluminum Mfg. Co.)

FRY PAN

. . . made by the permanent mold casting process.

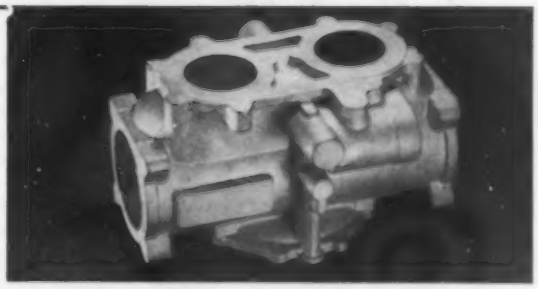
Cast in aluminum, this fry pan has its finish already applied when it appears in "as cast" condition.

An inert porcelain permanent finish is applied which is an integral part of the casting itself.

Thus the economies to be had by using the permanent mold process include such useful applications as weight reduction, reduced machining time and costs, and greatly reduced finishing time and expenses.

(Permanent mold casting; Monarch Aluminum Mfg. Co.)

FUEL EQUALIZER



. . . for use in aircraft. Cast in aluminum, it is made so as to have the qualities of high strength and great density which are to be found in permanent mold castings. The intricate contours of its design and the extensions on its outside surface make this part a particularly difficult design project.

The designer has overcome many of the development problems connected with production of this part.

(Permanent mold casting; Thompson Products)

idea file...

PERMANENT MOLD CASTINGS

LADDER FLANGE

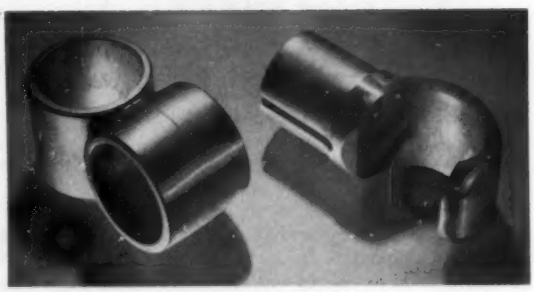
. . . cast in aluminum. Used where strength and durability are needed most, this part must be designed and made so as to be able to stand up under a great deal, of wear, stress and strain.

Because the permanent mold casting process gives a part which possesses great density, added strength, and extra dependability, this method has been specified for their production.

The center opening must have accurate sizing and be held to close tolerances.

(Permanent mold casting; Thompson Products)

SCAFFOLD



. . . fitting for aluminum scaffold. Because of the nature of the structure where the question of human life is involved, the soundest castings are a necessity.

Main savings were achieved by conversion to the permanent mold casting process. First was an appreciable 20% in strength-to-weight ratio. Next was a lowered casting cost. Third was the elimination of machining. Castings formerly made, needed machining of inside and outside diameters.

(Permanent mold casting; Eastern Casting Corp.)

TONE ARM

. . . for a loud speaker. This part was once sand cast, a method which left it with many finishing problems to be solved before integration into the assembled machine was a final fact.

Before being cast in a permanent mold, the part needed its entire outside turned. Both ends were faced. The end entering the base was threaded.

Three small holes in bosses were difficult to finish because ID and OD differences in the sand casting varied.

(Permanent mold casting; Racorn Electric Co.)

WRENCH

. . . cast of non-sparking metal. This wrench is precision cast in a safe copper base alloy which makes it useful on jobs where sparks might cause fire.

The alloy of which the tool is made will not create an accidental spark if scraped against another tool, concrete, or metal. Thus it may be used for such things as gas or oil line repairs, etc.

By using the advantages of the permanent mold casting process, the designer gives the wrench strength and accuracy.

(Permanent mold casting; Alcaloy Inc.)

The Investment Casting Process

THE investment casting process came into commercial being largely because shapes were required in high temperature alloys that could not be fabricated in any other manner. From this beginning, the entire industry has grown. Today, investment casting is finding its greatest potential in the replacement of assembled elements. Instead of a plurality of parts that were put together by welding, riveting, bolting, etc., it is now possible to make a single casting that is mechanically far superior to the previous assemblage and, in most cases, considerably less costly.

WHAT METALS CAN BE CAST?

Any metal that can be cast, can be investment cast. In addition, there are numerous alloys that are most successfully investment cast that could not be handled by any other fabricating method since they are essentially non-machinable. By investment casting accuracy and surface perfection are sufficiently good so that machining of these parts is required other than grinding.

WHAT ARE TOOLING COSTS?

Tooling costs for the investment casting process are moderate. This is especially true when the complexity of the average part produced is considered. While quoted costs may seem high, when compared with initial tooling and the necessary special jigs and fixtures for assembly that would be necessary if another method of production were used, the tooling charges become quite moderate.

In those plants using wax patterns, molds are often made of low carbon steel. Where plastic patterns are used it is more usual to make molds of hardenable tool steel. The frozen mercury patterns generally require a hardened steel mold.

Tooling costs will vary with the finish requirements and with the dimensional accuracy that is required. Unlike the die casting process, the length of the run and the expected life of the die have little bearing on the initial tooling costs.

WHAT IS THE LEAD TIME?

Lead time is generally less for investment castings than for die castings. Assuming normal plant loads, the first sample parts may be delivered in from two or three weeks to as many months.

On repeat orders, lead time may be as little as one or two days depending on the foundry load. A normal cycle from the time the mold is put into production to finished casting is from 24 to 48 hours depending on individual foundry practice.

WHAT IS THE ACCURACY?

As in all foundry operations, the most open tolerances possible are desired. Average practice in the industry holds all dimensions to ± 0.005 in./in., even across parting lines. Smaller tolerances within any solid mold part can be maintained, but costs rise as the requirements are made more stringent.

As in the case of die casting, selected dimensions within a solid mold segment can be held to as little as ± 0.001 if required.

Surface finish is controllable within limits. All investment castings have a good surface finish as a result of the casting method. If the part will stand a higher per-piece cost considerable improvement in surface is possible over normal foundry practice.

WHAT ARE THE LIMITATIONS?

Investment casting can be used economically for both long and short runs. Since molds are individually made, any mixture of shapes can be poured at the same time provided an adequate number of parts are required to warrant melting metal.

Naturally, costs are lowered on long runs since more efficient production methods are possible than on short runs.

Probably the intricacy of the castings that can be made, the excellent surface finish and the freedom from large amounts of machining on the castings are the most important advantages.

Both internal and external threads can be cast, but a class two fit is about the best that can be secured and this is difficult. Generally it is preferred to cut threads as a second operation.

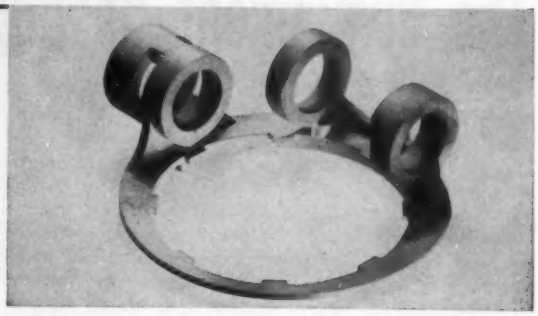
WHAT ARE THE ADVANTAGES?

Because a large amount of hand work by semi-skilled or skilled labor is involved in the production of investment castings the costs are liable to be high. These costs must be offset by decreased machining or simplified assembly or by both.

Due to moderately high tooling costs, the process is generally uneconomical for very short production runs. If, however, a design is frozen for a long period of time and a number of short runs are to be made, then the process may be more attractive.

idea file...

AIRCRAFT ENGINE

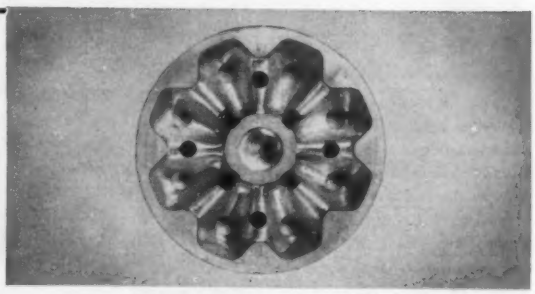


. . . component used in the newest type of improved aircraft. The part is made of 4140 steel alloy and is another fine example of combining components into a single part.

Once an assembly, it was originally designed to be manufactured by assembling and welding several components. Result was an extreme amount of warpage. The method was costly and otherwise unsatisfactory.

(Investment casting; Midwest Precision Castings Co.)

BRAKE WHEEL



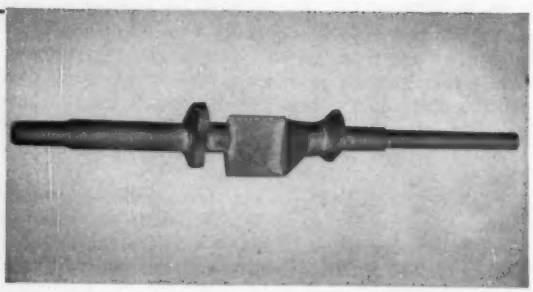
. . . used in aircraft. This highly involved, aircraft, electronics component is a fine example of the advantages to be gained by using the investment casting process in the production of intricate parts.

The wheel is cast in A.I.S.I. 4040 alloy with total strength of the entire part provided for in the basic design specifications.

The brake wheel, as seen at right, is 5⅝" in diameter and is 1⅜" in height.

(Investment casting; Midwest Precision Castings Co.)

CAM SHAFT



. . . of extra-small proportions once needed many machining operations. As many as six turning operations were needed. Next came six, involved, milling operations.

Worse yet, more than half of the raw material was wasted because the parts had to be machined from one-inch bar stock in order to make sure that sufficient metal would be available to complete the part.

Since switching production of these parts to an investment casting, machining has been minimized.

(Investment casting; International Nickel Co.)

COMPASS NEEDLE

. . . used for navigation. The problem facing the manufacturer of this compass needle, baffled by obstacles facing his product's successful completion, was solved by using an investment casting.

Because the metal was unusually thin, .05", the problem was even more difficult.

The precision casting process produced a needle within the close tolerances of .003", as cast.

(Investment casting; Crucible Steel Co. of America)

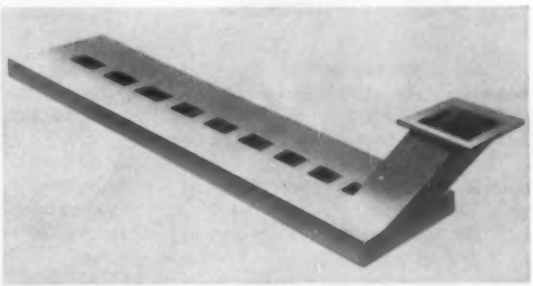
ELECTRONIC

. . . part is seen at right, after being cast from a frozen mercury pattern. This form of investment casting was done to avoid hand tooling the inside of the part.

At best, this long, thin-walled piece would have been an extremely difficult assembly job.

It is cast in 365 Aluminum. One wall is limited to a thickness of .05"; tolerance is .006". Elbow at end has an angle of 120°. Weight is two pounds.

(Investment casting; Mercast Corp.)

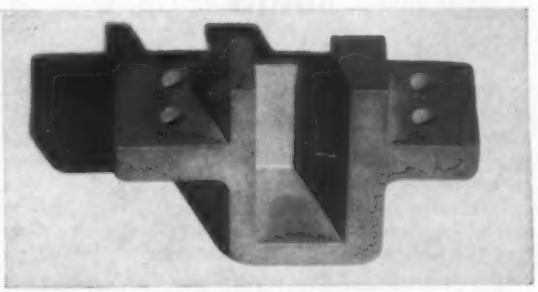


LATCH

. . . for laundry equipment. This latch is used on commercial laundry equipment. Service conditions require that a material be used which will be strong, corrosion resistant and resistant to abrasion and galling. The dimensional accuracy must be within 0.00r in./in.

To reduce the high machining costs that would result from the use of a sand casting, investment casting was choosen. The change to this method of fabrication cut costs, speeded production and made a better part.

(Investment Casting; International Nickel Co.)



FUEL SELECTOR

. . . for a jet aircraft engine. Cut in half for the reader's inspection, this photo at right shows the intricate internal passages which are most feasible to cast by using the investment casting process.

The jet engine fuel selector has many, highly involved passageways. In this casting seen here, Ceramicast (the Shaw Process) was especially adaptable to this design intricacy. The alloy chosen for this particular part is a high strength stainless steel.

(Casting; Lebanon Steel Foundry)

GRIPPER DOG

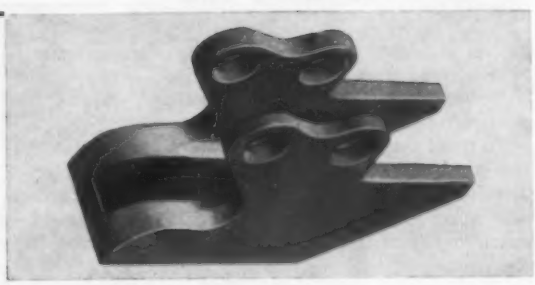
. . . for the can industry. This investment casting was originally machined from bar stock.

It was to eliminate the expensive machining operations required on the bar stock that the manufacturer switched to the precision casting process.

Important reason for the change was also the need for close tolerances.

By specifying Maxel 3½-B, a deep hardening alloy steel, strength, toughness and hardness were obtained.

(Investment casting; Crucible Steel Co. of America)



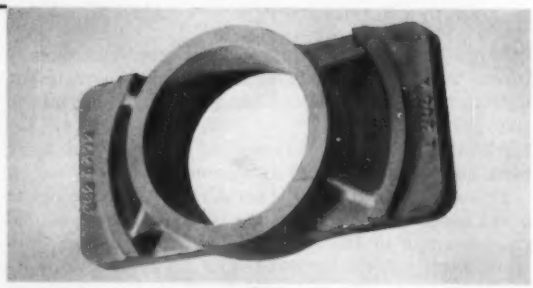
HOUSING

. . . for a jet engine bearing. This casting was once possible only after extensive machining operations.

The high accuracy necessary for bearing surface added to the cost of finishing processes.

The casting's designer has specified that the metal used in the manufacture of this part should be specifically adapted to the requirements of a jet engine bearing. He specified the utilization of low carbon steel in order to achieve a high-precision casting.

(Shaw process casting; Lebanon Steel Foundry)



IMPELLER

. . . used to pump liquid fuel. The complicated, swirling blades of this intricate impeller have been designed to adhere to dimension specifications.

Since it is carefully cast in 356-T6 aluminum, the impeller combines great strength together with corrosion resistance and lightness in weight.

Machining of this part has been reduced to a bare minimum. Since the blades are precision-cast, they need no final re-working or finishing.

(Investment casting; Midwest Precision Castings Co.)

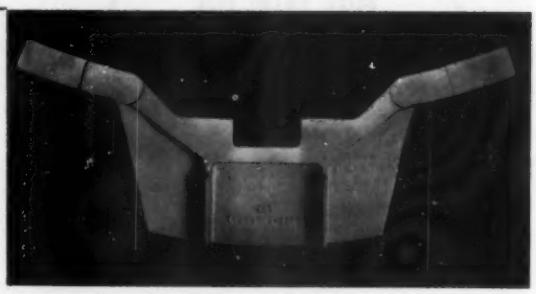
JET ENGINE

. . . fitting for the removal track of jet engines. This part is manufactured in 17-4PH, a stainless steel alloy which is precipitation hardened.

This casting is very wide, having an over-all width of approximately 14 inches.

Especially adapted to the investment casting process are the two, extremely thin metal sections in the two vertical members on the face of the casting.

(Investment casting; International Nickel Co.)



LATCHING CAM

. . . for a gas lift valve. This part was once expensively machined from bar stock.

Service conditions and specifications require that the part must be resistant to corrosion.

To meet these specifications, the cams are now being produced in the foundry as precision castings. They are cast from "S" Monel which is an age-hardenable alloy. Cost per cam was once $10.00 each when machined from bar stock, now cost $1.17 each.

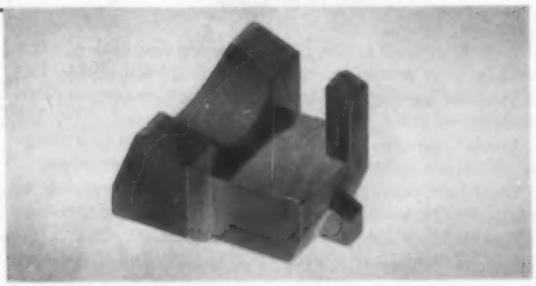
(Investment casting; International Nickel Co.)

MACHINE

. . . part made by the investment casting process for for accuracy and speed of production.

This part is an example of the shapes and extensions which may be obtained by the use of this type of precision casting. The cost of machining all these various surfaces and achieving the wide variety of dimensions which are apparent on the part at right, would far exceed its practical value.

(Investment casting; Austenal, Inc.)



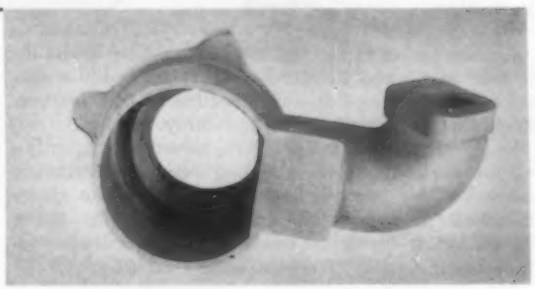
OUTLET ASSEMBLY

. . . was made as an investment casting after unsuccessful trys at other manufacturing methods.

As seen at right, it is cast as an entire unit with no welded parts attached. Metal used is 356 aluminum which gives the part durability with light weight.

When tested for strength, uniformity, and other qualifications, these castings must prove themselves by being qualified as X-ray sound.

(Investment casting; Midwest Precision Castings Co.)



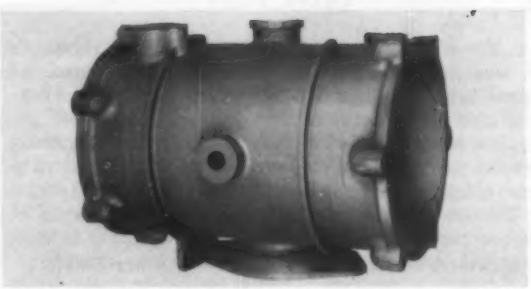
PISTON

. . . actuator cylinder. This investment casting is for a part used in the bleed control of a jet engine. One of the outstanding characteristics of this part is its number of heavy, relatively isolated sections.

In the casting process, each of these isolated areas requires its own individual feeder gate.

This cylinder is cast in 440A steel. It weighs 3 lbs., 9 oz. The size of the part, together with its thin wall sections, are remarkable for an investment casting.

(Investment casting; Precision Metalsmiths Inc.)



STEM TIP

. . . for needle valve. This part must be able to resist such aggressive materials as raw crude oil and hydrogen sulfide. While in contact with these substances, these tips were heated to temperatures above 500°F. Pressures were above 6000 pounds per square inch.

In order to withstand these tests, the parts must have a hardness of 600 Brinell.

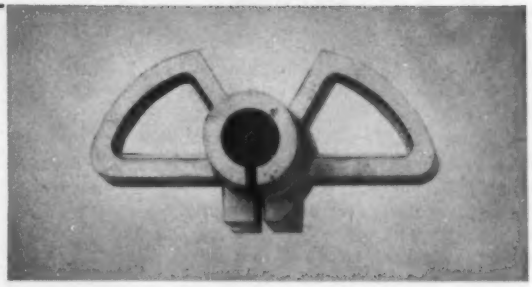
Precision investment casting is the only practical production method.

(Investment casting; International Nickel Co.)

idea file...

INVESTMENT CASTINGS

SWITCH CAM



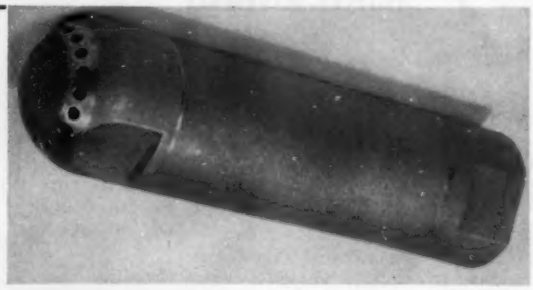
. . . is designed to be used in a commercial electric switch. It is precision-cast in A.I.S.I. 1030 metal. Big advantage here is the fact that the switch-cam is close to finished state when casting is completed.

Machining operations have been reduced to a minimum with a subsequent saving in production costs.

Only one hole is drilled in the finished casting to complete the switch-cam and make it ready for use in the electric switch manufacturing field.

(Investment casting; Midwest Precision Castings Co.)

NOZZLE

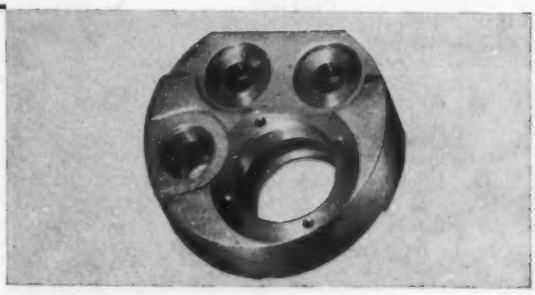


. . . used on an industrial oil burner. The assembly of this part once involved drilling 38 holes which were set at precise angles. Because of this feature, machining costs were understandably high.

Designers tackled the problem, solved it by specifying the use of investment casting as a manufacturing method. An immediate advantage was the sharp reduction in production costs by 40%. By using Monel, better corrosion resistance was secured.

(Investment Casting; International Nickel Co.)

VALVE BODY



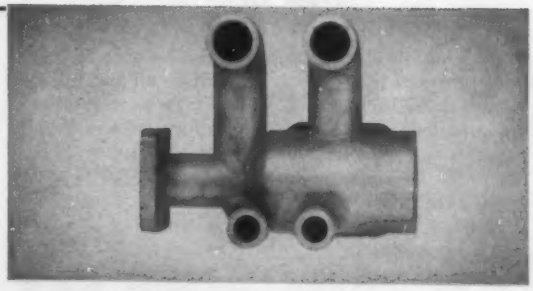
. . . for a three-position, solenoid-actuated valve. As it was first designed, the valve body was made of three brass forgings which were assembled by brazing after being machined.

Now made by the investment casting process using frozen mercury patterns, the part is produced as a one-piece investment casting.

Two molds are used to make separate patterns of frozen mercury.

(Investment casting; Alloy Precision Castings Co.)

VALVE HOUSING

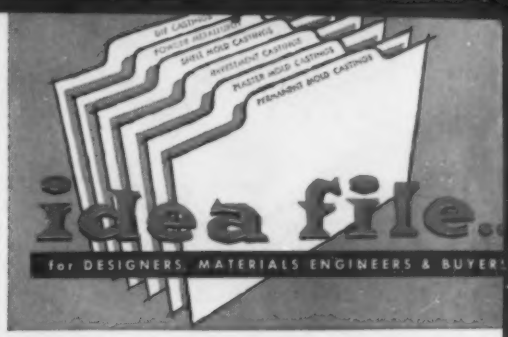


. . . is a light-weight aluminum casting. The vents and openings would be particularly difficult to produce commercially by any other means besides investment casting processes and methods.

The patterns for these very extensive flow-paths are specified for production as parts with water-soluble cores which disintegrate when wetted.

The alloy used for these valve housings is designated as 356 aluminum casting metal.

(Investment casting; Midwest Precision Castings Co.)



The Powder Metallurgy Process

UNIQUE among the precision metal fabricating methods, powder metallurgy does not involve the melting and pouring of metal. Another mass production fabricating method, powder metallurgy is singularly well adapted to the repetitive production of parts at very low labor charges per piece. Practically no skilled labor is involved in the production of parts so that costs can be held very low.

WHAT METALS CAN BE MOLDED?

Theoretically, any metal that can be made into a finely divided powder can be fabricated by powder metallurgy. Practically, copper and copper base alloys and iron are the two classes of metals which account for the greatest tonnage and number of parts. Tin and zinc powders are used mostly as admixtures to cooper powder to form bronze and brass alloys. Solder powder is molded to make pre-forms for both torch and furnace soldering.

A few specific applications exist for nickel powder and this field is growing. Fabrication of aluminum powder into pre-forms for impact extrusion and drop forging is well established in Europe, but has not gained much impetus in this country.

WHAT ARE TOOLING COSTS?

Tooling costs for powder metallurgy are generally high and probably rank second to die casting in costs.

Where average length runs are to be made the tooling is generally in high carbon, high chromium air hardening tool steel. For those parts where very long runs are assured, cemented carbide die components are now in general use. These dies may have a somewhat higher first cost than steel tools, but their life is so much greater that over long runs the tooling costs per unit are very low.

Except for moderately large numbers of parts per run, powder metallurgy may be uneconomical since tooling and set-up charges are high.

WHAT IS THE LEAD TIME?

For parts of simple design, such as a plain bushing, lead time is short, generally only a few weeks. As the complexity increases lead time grows and when carbide dies are made is longer than for steel tools.

Set-up and run-in time is shorter for powder metallurgy fabrication than for die casting since there are few adjustments, to get the tools working.

In cases where an unusual powder mixture is to be pressed and sintered, a some what greater time lapse must be allowed for the fabricator to work out details of pressing and sintering that might not have been apparent at the outset.

WHAT IS THE ACCURACY?

An extremely high degree of accuracy is possible by powder metallurgical methods. Normally the fabricator prefers to hold dimensional tolerances to from 0.003 in./in. to $\pm$0.005 in./in. The most difficult dimension to hold is in the direction of applied pressure and it is general practice to allow greater latitude in these tolerances.

Where closer tolerances are required, coining is necessary. Through the use of this procedure it is possible to hold dimensions within the die to $\pm$0.001 in./in. and, in some cases less.

Because the compressed powders must be ejected from the die without destroying the part or applying too high an ejection pressure the die walls, core rods and punches must all be carefully polished. This requirement automatically gives to the parts a good surface finish. Coining improves the surface somewhat, but it is seldom that surface finish is specified. Where a better than commercial finish is required a second operation is generally required.

WHAT ARE THE ADVANTAGES?

Powder metallurgy is able to produce parts with unique properties not attainable by any other method. Mixtures of immiscible metals are readily made as are mixtures of metals and non-metals.

Within design limitations, powder metallurgy is one of the lowest cost production methods available. The actual fabrication of parts is almost entirely automatic and no skilled labor is needed for operation below supervisory levels.

There is essentially no scrap generated by the process and once tooling, pressing conditions and sintering conditions have been established there is very little rejection due to faulty techniques.

WHAT ARE THE LIMITATIONS?

The most severe limitation is in size and shape of the part that can be made. Since considerable tonnage per square inch is required to compress the powders, the area of applied pressure can not be too great, for present press capacity.

The problem of part ejection limits the shapes that can be made. However, in many cases simple machining operations on the fabricated part allow the use of this method with part, if not all, of the saving possible.

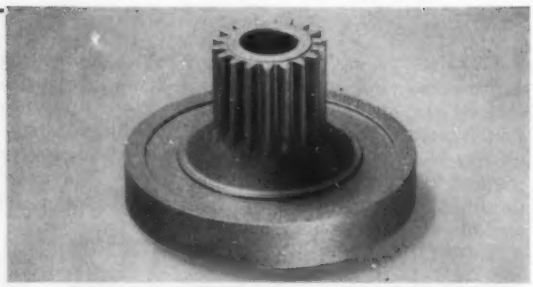
Inability to successfully surface finish by the more common plating methods is another limitation.

GEAR

. . . used in the manufacture of a washing machine. This part is one of several components that make up a complete agitator drive unit.

The cost of producing this part by conventional machining and finishing methods would be too excessive for practical use as would the cost of a machined casting.

By using powder metallurgy as a manufacturing method, a strong, one piece part is made very economically as against either an assembly of two or more parts or an iron casting. The iron powder part is infiltrated for added strength.



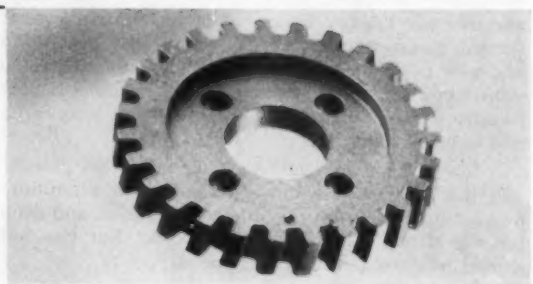
CASEMENT

. . . gear used in the window casement mechanism. This precision-made helical gear must be designed to resist temperature and corrosion.

Made of powdered iron, it is stronger than parts made by some other precision-casting processes.

It is much more economical to manufacture by the powdered metal method than by costly machining, stamping, or forming.

(Powdered metal part; Yale and Towne Mfg. Co.)



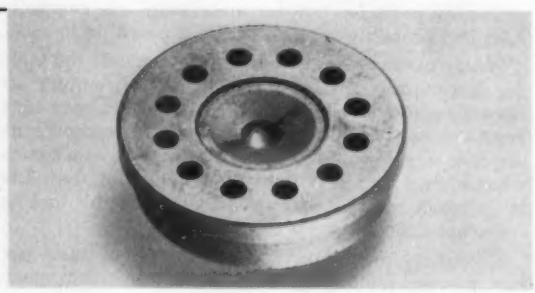
CAVITATION

. . . plate used in shock absorbers. This cavitation plate is one of the many precision cast parts which has been adapted to industrial use.

Because of the constant action of the cavitation plate as it transmits hydraulic fluid in each movement of the piston, care must be taken in its manufacture.

The designer has specified that this plate be made of pressed, powdered iron. The holes are cast into the part in the process and are not drilled or machined in.

(Powdered metal part; Yale and Towne Mfg. Co.)



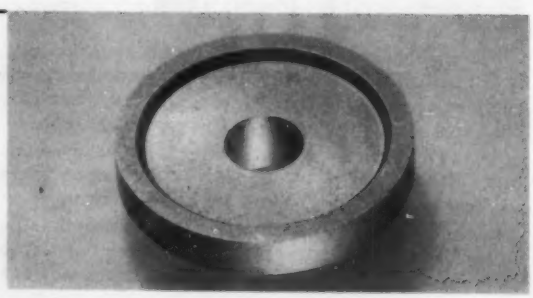
CLUTCH

. . . housing. Designed for use in a duplicating machine, this specially adapted clutch housing is a precision part cast to true dimensions.

Specified as a clutch housing with unusual wear-resistant qualities, this piece is qualified for such use.

When a part is machined, waste and scrap are considerable. However, when the clutch housing is manufactured by the powdered metal method, much of the waste is eliminated.

(Powdered metal part; Yale and Towne Mfg. Co.)



CROSS HEAD

. . . parts. These three powdered iron cross heads have been designed for specific use in an involved government project.

Since many of their characteristics cannot be revealed, it suffices to state that these parts have been designed to stand up under a great deal of constant wear and irregular stress periods.

The designer was anxious to develop a cross-head part which would be economical to produce.

(Powdered metal part; Yale and Towne Mfg. Co.)

ECCENTRIC

. . . with pitman. Making this piece by means of the powdered metal method has given the manufacturer a dependable part at an economical price.

Formerly, it was difficult to machine the part and keep the two holes in place. The eccentric was made of cold rolled steel. The pitman of a brass casting. Now they are made of iron powder.

With no machining costs, production has been increased.

(Powdered metal part; General Powdered Metal)

FEED PAWL

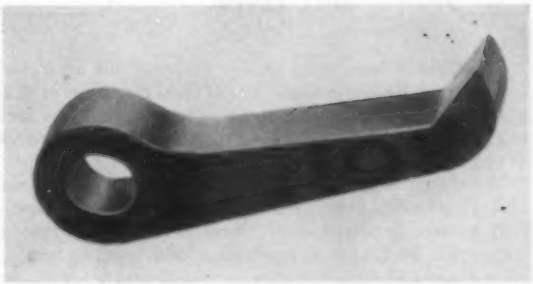
. . . for a complex machine. This part is precision molded and sintered in iron powder.

Outstanding achievement in the use of powdered iron for this piece was the extraordinary saving accomplished. This was a pegged at a high of 64.6%.

Tolerances which it is possible to maintain on this sintered iron piece are .002" on the overall thickness.

The length from the hole's centerline to the tip of the part is held to the same tolerance.

(Powdered metal part; Stokes Corp.)

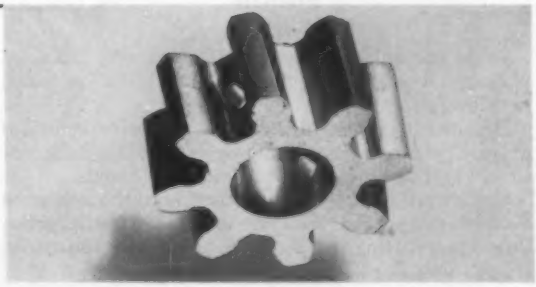


HELICAL GEAR

. . . for hay baler. This precision part, made of powdered iron, gives close dimension accuracy without the machining operations which make production of gears such a costly procedure.

The designer specified a sintered iron piece because manufacturing these parts would simplify and speed up the manufacture and assembly of the agricultural machinery itself.

(Powdered metal part; Yale and Towne Mfg. Co.)



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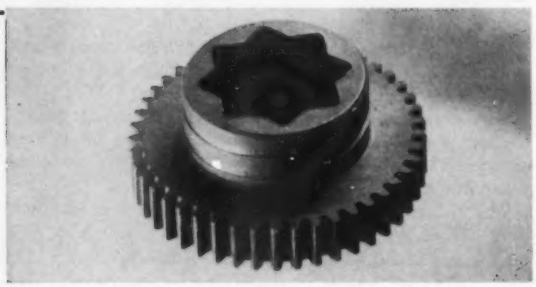
ICE CREAM

. . . freezer gear. This is one of the important parts which keeps a vital summer-time industry flourishing. Made of powdered iron, the gear has the eight-pointed inside, splined opening which would be costly to make if the precision molding process was not used.

If the part were machined, the flange would have to be cut, teeth formed on the outside-gear diameter, and the inside opening made.

Threading would be an added operation.

(Powdered metal part; Yale and Towne Mfg. Co.)



MANIFOLD

. . . adapter for use in the automotive industries. Since it is destined for the automotive field, this manifold must be designed and built so as to resist heavy wear. It must also be able to withstand heat, temperature change, and other hazards.

The added strength of the pressed, powdered iron makes the manifold adapter resistant enough to the previously listed hazards, so that it meets stringent requirements and stands up under steady usage.

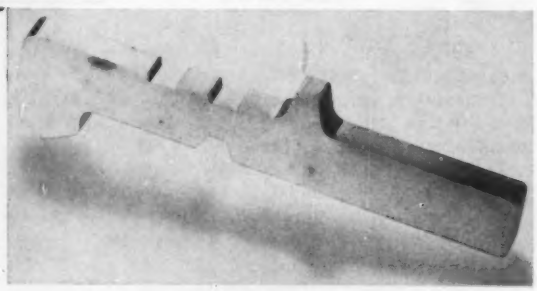
(Powdered metal part; Yale and Towne Mfg. Co.)

MILL LEVER

. . . which is used as a switch actuator for an automated mill. Because much of the final finishing of this part would have been expensive machining, the fact that it can be re-designed for production by the powdered metal process is of special interest.

The designer has given extra attention to tolerances and dimensions once achieved by cutting and grinding. Steady production of these parts means that a way must be found to produce a well made part.

(Powdered metal part; Yale and Towne Mfg. Co.)



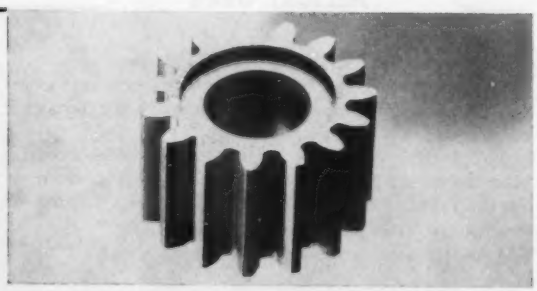
PINION

. . . for use in the assembly of a washing machine. This is a fine example, at right, of a precision made, powdered iron part.

Because it must withstand the corrosive action of a laundry atmosphere, this piece was carefully designed and its specifications rigidly observed.

Costs were cut for the manufacture of the appliance because of application of the powdered-iron process, thus contributing to the benefit of the consumer.

(Powdered metal part; Yale and Towne Mfg. Co.)



RATCHET

. . . made of sintered powdered brass. This small ratchet is used in the inner works of a complicated electric mechanism. Before its manufacture by use of the powdered metallurgy process, it was made at a cost of approximately twice that needed at the present time.

Savings put into effect by its re-design for production by the powdered metal precision molding method have been noted at 49.3%.

(Powdered metal part; Stokes Corp.)

ROLL BEARING

. . . made of sintered bronze powder. The overall cost of producing this part was reduced by the impressive figure of 46.6%, a saving which made the re-design of the roll-bearing extremely worth while.

Added advantage is the fact that tight tolerances can be easily maintained by use of the powdered metal method of precision molding.

Outside diameter: ±.001″; the bore: ±.001″; and the length of the part itself: ±.001″.

(Sintered metal part; Stokes Corp.)

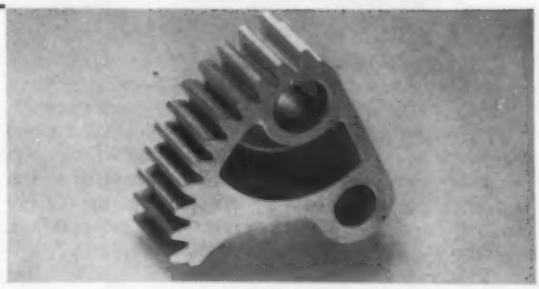
SECTOR GEAR

. . . for a washing machine. This gear segment must meet exacting specifications.

It must be strong, wear-resistant, and must be able to function in the washing machine without corroding. It is made of powdered iron which has been infiltrated with copper for added strength.

The deep draw in the side of the part cuts the total weight of the gear-sector, lightening the load on the machine and adding to its efficiency.

(Powdered metal part; Yale and Towne Mfg. Co.)



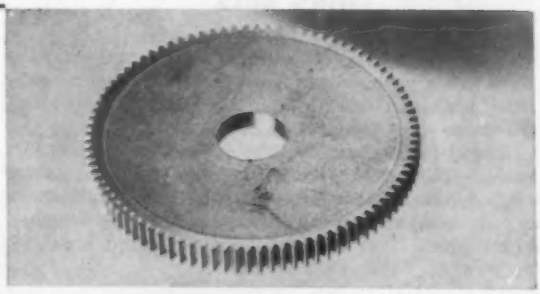
TELEPHONE

. . . gear for use in the communications industry. This part, made of powdered brass, is used to great economical advantage.

Because of the mass production of these parts, and the great need for them in the telephonic field, manufacturing them by other means would not be feasible.

For this reason, the designer specified the use of powdered brass for gear-material. The result adds to telephone efficiency.

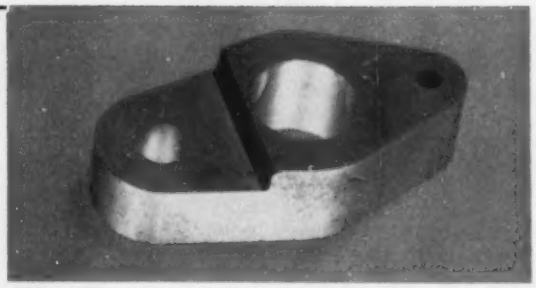
(Powdered metal part; Yale and Towne Mfg. Co.)



idea file...

POWDER METALLURGY

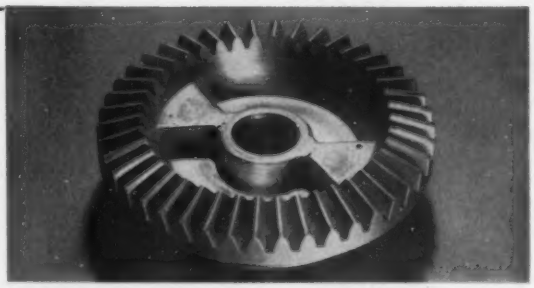
TOGGLE LEVER



. . . made from pressed powdered iron. Once produced in cast iron, this part required expensive machining operations. One side was disc-ground for location in a drill-jig. Three holes were then drilled, the stepped surface was milled in a multiple-fixture.

The new method, using pressed, powdered iron, gives a part which needs no secondary finishing operation. Minor design changes included the introduction of a 1/32" radius in the corner and a three-degree taper. *(Powdered metal part; Todd Co.)*

TRANSMISSION

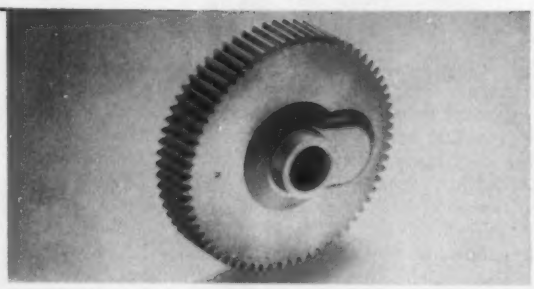


. . . gear for powered lawn mower. This bevel-gear is new being produced for use on a man-carrying power-mower.

Made from copper infiltrated Swedish sponge MH-100 iron, the part was previously sand-cast and machined.

Costs of manufacture have been reduced. The bevel-gear once cost $1.56 each, to produce. Since converting to the powder-metal precision molding process, this cost has been reduced to $1.10 each. *(Powdered part; International Powder Metallurgy Co.)*

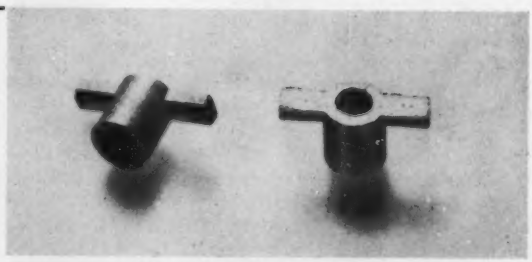
WASH MACHINE



. . . crank gear. Precision made of powdered iron which is infiltrated with cooper, this crank gear for a washing machine is part of an agitator drive unit.

By producing the piece through the powdered metal process, the complete infiltration of copper through the iron is feasible. This gives added strength to the part, making it especially adaptable to the heavy working conditions which it will meet in operation. *(Powdered metal part; Yale and Towne Mfg. Co.)*

WING NUTS



. . . for a portable travel iron. Designing these wing nuts was a problem that forced the designer to consider high and low temperature-extremes to which the parts were subjected while in everyday use.

Added to this was the problem of giving the part enough strength to hold up under use. The wings need a great amount of ductilty because much stress is put on them at the point where they are attached to the shaft. The wing nuts are powdered brass.

The Plaster Mold Casting Process

A graduate of the statuary bronze casting industry, the plaster mold casting industry is unique. Disregarding the use of plaster mold casting for the manufacture of match plates for the sand casting industry, this method of production is singularly well adapted to the production of short runs and prototypes.

WHAT METALS CAN BE CAST?

Because the mold material is entirely, or mostly, a gypsum plaster, only those metals having a relatively low melting point can be cast. The most commonly cast metals are aluminum base alloys, the brasses and the bronzes. If such items as tire molds are included, the most important alloys are the aluminum base ones. Without this group the number of castings in brass and bronze probably equals the number of aluminum base castings.

WHAT ARE TOOLING COSTS?

Tooling for plaster mold casting is probably the least costly of any of the precision molding processes. The mold is generally made in jeweler's brass because it is easily workable and can be given a fine finish. The plaster mold is then cast around this mold, generally using the cope and drag technique. It is probable that the individual molds, when ready for pouring cost little, if any, more than a comparable green sand mold.

WHAT IS THE LEAD TIME?

For plaster mold casting, lead time should not be much more than for sand casting if wood patterns are used. If metal match plates are used the lead time for plaster mold casting may be less.

As in the other processes, the dimensional accuracy and the surface finish requirements can greatly influence lead time. Where normal foundry tolerances and finish are acceptable lead time is a minimum. As either of both of these restrictive features become more important then the time that is required to make the original pattern is naturally increased.

WHAT IS THE ACCURACY?

Normal foundry practice for plaster mold casting is difficult to define. Several different and distinct methods are employed and each has its own advantages and limitations.

In the Capaco process only relatively small castings are made. The mold parts are fastened to a common backing and several different castings may be included in a single flask. This method, also called the unit strip method, allows the continuous circulation of the patterns to maintain reasonably high production rates. Unit patterns are quickly and easily changed by simply unscrewing the pattern parts and substituting a different one. The only requirement being that all cavities in any one flask be cast in the same metal. Accuracy in this process is generally held to 0.010 in./in. within a mold half. Surface finish can be excellent if required.

The Antioch process is a modified plaster mold casting method using basically a mixture of fine silica sand and plaster as the mold material. Size of casting is no problem in this method since the molds are generally made up of a plurality of carefully matched parts. Accuracy of dimensions is phenomenal when required. Castings up to six and eight feet in diameter have been made with a total variation across the largest dimension of only 0.010 in.

Surface finish in this method is as good as any other plaster mold casting process.

A third method is essentially green sand casting with the difference that gypsum plaster is used as the mold material instead of sand. Accuracy of this method is about the same as the Capaco process. Large castings can be cast by this process.

WHAT ARE THE ADVANTAGES?

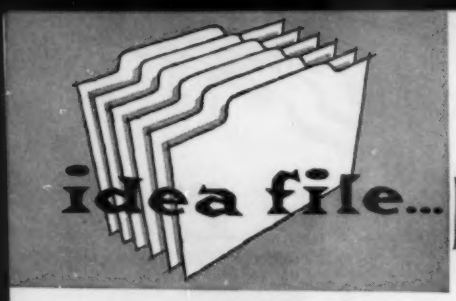
Probably the outstanding advantage of this method of production is the low production costs, particularly when a short run is required. Extremely intricate coring is possible and the surface finish and accuracy are far superior to sand casting.

Because of the accuracy with which castings can be made, considerable surface finishing and machining can be eliminated.

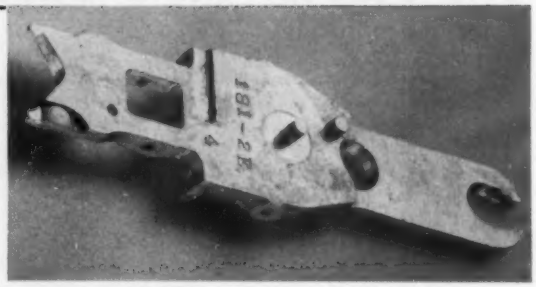
By selection of the proper method of production there is no limit to the size of castings that can be made and even when strict dimensional tolerances are imposed the per piece cost is very often far below the cost of a machined sand casting. The process is also eminently suited for the manufacture of prototypes before embarking on an expensive tooling program for another method such as die casting.

WHAT ARE THE LIMITATIONS?

The materials that can be cast are one severe limitation. Since none of the ferrous base metals can be poured into a plaster mold, only the aluminum and copper base alloys are widely cast. Rates of production are relatively slow, about the same as sand casting.



ADJUSTMENT



. . . lever for 24-hour thermostat. Small cast parts are kept to exact dimensions by use of the plaster mold casting process. The adjustment lever is cast in #10 brass and has been held to close tolerances.

Machining operations include such minor functions as hole-drilling, de-burring, and cleaning up spot faces. Part numbers are cast when the part is in the mold. Few final finishing operations are required.

(Plaster mold casting; Universal Casting Corp.)

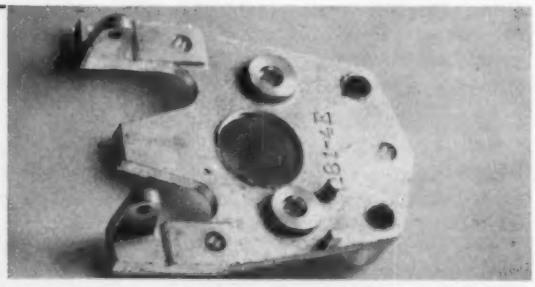
CARRIER BASE

. . . as it is used with power-saw assembly. Cast in plaster molds for extreme accuracy and close tolerance specifications, this part is seen, at right, as it is when used in final assembly. No final finishing operations are needed for the casting which is used in such a position as to be entirely visible.

The designer specified the use of precision casting methods to insure holding dimensions to the close tolerance limit of .005".

(Plaster mold casting; Ohio Precision Castings Inc.)

LEVER BEARING



. . . plate for a day-night thermostat. This small, extremely accurate bearing plate for the thermostat lever is precision cast.

Made in #10 brass, the part is made in plaster molds so as to keep surfaces inside limits of the close tolerances demanded. Final machining of the piece is kept to a bare minimum, being limited to little more than hole-drilling operations. Numerals used as part numbers, are also cast on the face of the part.

(Plaster mold casting; Universal Casting Corp.)

RADAR

. . . component for use in detection scanning device. This part is precision cast by means of the plaster-molding process so as to produce a part with accurate dimension and close tolerances.

The plaster mold casting was specified as such by the designer because all interior surfaces of the part must be exceptionally smooth, probably under 15 micro-inches RMS. Also, specifications linked to this plaster mold-cast part ban sharp corners.

(Plaster mold casting; Universal Castings Inc.)

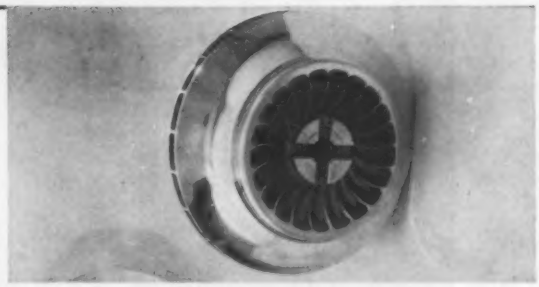
SHROUDED

. . . impeller casting. This plaster mold casting is used for a supercharger on a marine engine.

Made of aluminum, this casting has been especially designed to resist corrosion from constant contact with marine atmosphere, including salt spray.

Other desired characteristic, given the casting by the designer, is the ability to operate under tension and stress. The impeller casting must be so made as to withstand a motor speed of 40,000 R.P.M.

(Plastic mold casting; Eclipse-Pioneer)



TIMING SLIDE

. . . cast for use on the table of a power saw. This part, which is clearly visible on the finished machine, is precision-cast in great detail.

The fine criss-cross of teeth seen on the flat side of the part, at right, have been deliberately cast into the part in such a precise way as to take the thread of the screw-feed which is integrated into the saw's over-all mechanism. Metal used is #40 bronze.

(Plaster mold casting; Ohio Precision Castings Inc.)

TWIST CLAMP

. . . adapted to power saw. Once the making of this small part was a time-consuming production problem, both for the manufacturer of the parts themselves, and for the company making the power saws.

Now produced by the precision casting process, these clamps are used without a final finishing operation by the power-tool manufacturer.

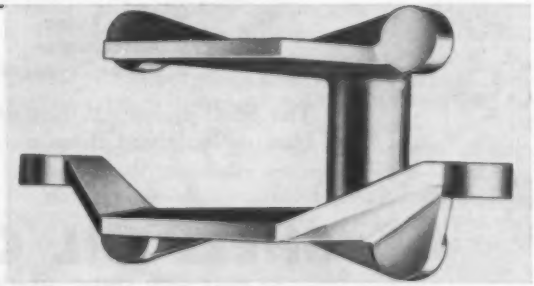
Because of their well defined accuracy and smoothness, the clamps are easily held to a tolerance of .005".

(Plaster mold casting; Ohio Precision Castings Inc.)

TWO PLANES

. . . held to close tolerances at the unsupported end. Made by the plaster mold casting method, the part seen, at right, is a fine example of a difficult project. The designer specified plaster mold casting methods as the best precision casting process. It is possible, using this method, to hold dimensions to close tolerances and keep surface smooth enough to eliminate much of the need for final finishing.

(Plaster mold casting; Ohio Precision Castings Inc.)



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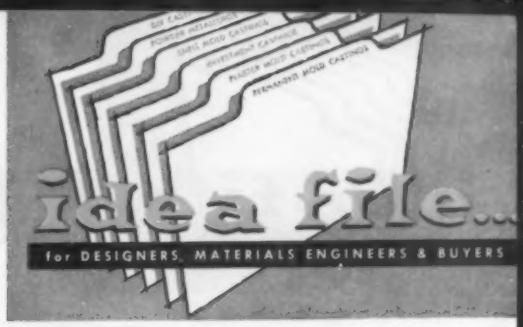


The Shell Mold Casting Process

THIS process is still too new to be properly evaluated. It is basically an improvement of the green sand casting process and for the most part is still used as an adjunct to sand foundries.

Continual research and development is still going on in the development of more fully mechanized equipment, improvements in binder materials, improved adhesives, and other phases of the process.

WHAT METALS CAN BE CAST?

Any metal or alloy that can be cast in green sand can be cast in a shell mold. Except for the method of making the mold itself, there is no difference between the two processes. In fact, many foundries that employ both methods of making molds intermix them on the casting floor. Subsequent treatment such as shake out, cleaning, etc. are identical for the two methods.

WHAT ARE TOOLING COSTS?

Pattern making for small molds is somewhat longer than for sand molds. This is primarily caused by the closer tolerances that are characteristically required and the better surface finish that is specified.

Actual mold making after the patterns have been made varies with the foundry. At the slowest it is about the same as for green sand. In foundries that are mechanized, the production of complete shell molds is several times the rate for comparable sand molds.

As in every other precision molding process the lead time is influenced by both tolerance and finish specifications. As tolerances are tightened and surface finish improved, the lead time increases.

WHAT IS THE ACCURACY?

Because the shell molding process is relatively new, many claims as to dimensional accuracy have been made that could not be supported in practice. Unquestionably, certain dimensions within a mold half can be held to a tolerance of ± 0.005 in./in. However, such tolerances are exceptional and in general the designer should anticipate that within a mold half the average will be ± 0.010 to ± 0.015 in./in. while across a mold parting the accuracy will be only about ± 0.020 to ± 0.030 in./in.

Cored holes as small as 0.050 in. diameter can be made if the hole is shallow. On deeper holes the smallest hole diameter is about ⅛ in.

There is a great variance from foundry to foundry in dimensional accuracy. The most reliable procedure is consultation with a reputable foundry before dimensional tolerances are specified.

Surface finish is difficult to assess. The normal shell mold is made with considerably finer sand than is used in green sand molding. This alone assures a better surface. When required, special sands can be used to give an even better surface. However, shell mold castings should not be used when a plated finish is to be employed unless considerable sanding, buffing and polishing is anticipated.

WHAT ARE THE ADVANTAGES?

The principal advantage of shell mold castings over green sand is in the greater accuracy attainable. Since the mold is rigid it will assume and maintain the accuracy of the pattern within reasonable limits. Slip, a common fault of sand castings, is almost completely absent in shell mold castings. Cores and mold halves are generally held in place with a thermo-setting adhesive so that once placed, and the adhesive cured, the danger of slip is essentially removed.

Again because cores and mold components are rigid, more complex parts can be made. Wall sections can be thinner and smaller holes cored than is possible with green sand molds.

Another of the outstanding advantages of the shell mold process is the smaller amount of skilled labor that is required. Once the pattern has been made, no skilled labor is essential on the molding floor. The result, of course, is lower labor charges per mold.

WHAT ARE THE LIMITATIONS?

The principle limitation of the shell molding process, at the present time, is in the size of castings that can be made. A fairly high degree of mechanization is necessary for the process to be economically feasible and for that reason pattern plate size is presently held to relatively small sizes. A plate of 27″ x 30″ is considered large.

Since pattern costs are relatively high and since considerable mechanization is required, the shell mold process is not suited for short runs. The greatest economy is shown when the pattern plate can be kept circulating in the molding line for a considerable length of time or when a design is sufficiently static so that the high pattern costs can be absorbed over a long period. A further costly item is the plastic bonding agent used to coat the sand and the adhesives used for bonding the mold parts.

One of the greater expense items connected with this process is the binder material and the mixing of the sand and binder. Some progress has been made in the field of pre-coated sands. When this becomes more standard practice the cost of shell molds should drop.

idea file...

ADJUSTER

. . . for automotive bearings. This is a malleable iron part re-designed for production by the shell-molding process. Result: a less-expensive casting.

Using this method allows the manufacturer to remove much of the casting's weight by taking advantage of lower draft angles, plus the inherent ability to draw deep pockets. Producing the casting by the shell-mold process allows a decrease in the amount of finish stock, gives better wrench-fit.

(Shell mold casting; Central Foundry)

BELL CRANK

. . . assembly. Seen, at right, is a shell mold casting which is destined to become part of a bell crank assembly for an aircraft escape hatch.

The precise dimensions possible from use of the shell mold casting method makes these parts so that they have little need of machining.

Because machining and finishing operations are reduced to a minimum, this casting has many economic advantages to offer its users.

(Shell mold casting; Eclipse-Pioneer)

BRASS NUT

. . . cast by means of the precision casting process so as to cut costs in many ways.

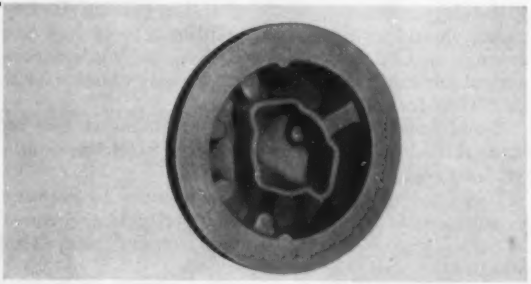
First of these economies is the scaling down of time once consumed in finishing and machining operations.

Second is the fact that shell-mold casting keeps the part to such close tolerances that scrap and waste from the finishing operations is kept to a bare minimum.

According to the manufacturer of these castings, the saving with shell molding is 25%.

(Shell-mold casting; Standard Brass Foundry)

COMPRESSOR



. . . head made for an air conditioning unit. This shell mold casting is a good example of the improvements and savings which result when precision casting methods are used in the manufacture of parts.

The shell mold casting process results in clean, sand-free casting surfaces and a greater uniformity of dimensions. This eliminates costly machining operations inside the chamber, on the outside diameter, and profile milling on the contour.

(Shell mold casting; Central Foundry)

FLANGED

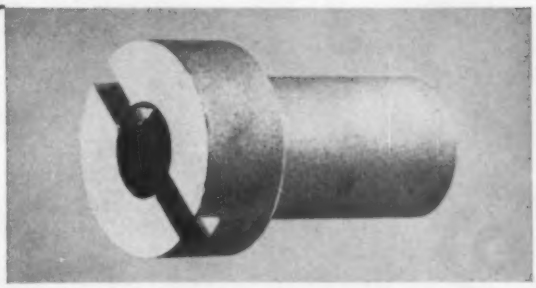
. . . fitting for public drinking fountain. This smooth-finished part must be able to withstand corrosion, constant use, and the water pressure met with in city water systems. The shell mold casting process produces the ultra-smooth surface seen here.

This area must take a chromium plate. Due to the fact that little polishing is necessary before plating, costs per piece are considerably reduced. Savings total approximately 45%, compared to former costs.
(Shell-mold casting; Standard Brass Foundry)

PROPELLER

. . . shaft cast in manganese bronze. This precision casting is a much more solid piece than those parts made by earlier methods. Although this casting is much lighter than those made formerly, it has much better machining qualities.

All machining of the outside diameter of the casting has been completely eliminated, since the finished part is within close tolerances as it comes from the mold. Machining inside has been reduced.
(Shell-mold casting; Standard Brass Foundry)



SPUR GEAR

. . . for agricultural machinery. This part is cast in a shell mold in order to insure uniformity. Other advantages to be had by casting these parts in shell molds are varied. The allowance for backlash is held to a minimum because of the casting's uniformity, smooth surface, and reduced draft. Also, a break-in is usually necessary for gears cast in green sand.

This period is eliminated when shell molds are used. Only a reaming operation is necessary.
(Shell mold casting; Lynchburg Foundry Co.)

STEERING LEVER

. . . gear. Machining this piece is a very expensive and very delicate operation. The three holes, other than those in the hub, must be reamed with a carbide tool.

But because the part is cast in a shell mold, there is less excess stock to be reamed. Another important result of using the shell-mold casting process is much greater accuracy in locating centers of the three holes.

Because of this the reamer has longer work life.
(Shell mold casting; Lynchburg Foundry Co.)

DATA OFFERED IN THIS MONTH'S ADS

the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.

2. **1,000 Shots per Hour**—according to Bulletin A-10, an engineering report on small die casting machines from ABC Die Casting Machine Co.

4. **Colloidal Dispersions** — Bulletin 425 from Acheson Colloids Co. describes the different lubricants available for casting use.

5. **Induction Melting Equipment**—to meet the requirements of investment casting is discussed in Bulletins 14-B and 27-B from Ajax Electrothermic Corp.

7. **Die Steel**—A concise four-page folder is offered by Allegheny Ludlum Steel Corp. giving handling and shop treatment details on "Potomac M" hot-work die steel.

8. **"Aluminum Casting Alloys"**—is the title of a new 66-page reference and data book just published by Alloys & Chemicals Mfg. Co.

9. **Alloy Metal Powders**—The use of these powders in the fabrication of parts, and the properties of these parts, are covered in detailed reports from Alloy Metal Powders, Inc.

11. **Die Casting Machines** — A complete descriptive folder is offered by American Die Casting Machinery Co. which explains their line of die casting machines and their installation and operator training services.

16. **Investment Castings** — Literature from Alloy Precision Castings Co. describes their plant and techniques for both frozen mercury and lost wax investment casting. Information is also given in designing, specifying, and buying investment castings.

18. **13 Models** — of die casting machines are described in bulletins from B&T Machinery Co. Machines range in capacity from 100 to 750 tons — for zinc, aluminum and brass.

21. **Safety Hydraulic Fluids** — Two grades of Ucon Hydrolubes are discussed in a new booklet published by Carbide and Carbon Chemicals Co., "Ucon Hydrolubes Spell Safety," Form 40134.

22. **Small Die Casting Machines**—A brochure from Cast-Master, Inc. gives full details and specifications on two new die casting machine models, the 7Z for zinc, tin and lead, and the 7A for aluminum, magnesium and brass.

24. **Complete Alloy Service**—and technical data on special, rare and vacuum-melted alloys is offered in a bulletin from Cannon-Muskegon Corp.

26. **Die Casting Machines**—Bulletin 5246 from The Cleveland Automatic Machinery Co. gives specifications of 50, 200, 400, and 600-ton machines for zinc and aluminum die casting.

30. **Die Cavity Sets**—A 12-page brochure from Detroit Mold Engineering Co. gives complete prices and specifications on six new standard sizes of cavity sets for die casting.

33. **Sprue Bushings, Spreaders**—Complete specification sheets giving all the uses and advantages of specially-designed sprue bushings and spreaders are available from Detroit Mold Engineering Co.

35. **Saves $5400**—Bulletin C-80 from Eclipse Fuel Engineering Co. describes a double-chamber dry-hearth-type metal melter for aluminum. Advantage for both large and small operations are discussed.

38. **Metal Cutting Coolant**—A water-soluble cutting coolant and other specialty lubricants and coolants are described in bulletins from Fiske Bros. Refining Co.

39. **Die Coatings** — A leaflet offered by Foundry Services, Inc. describes the advantages of their "Foseco Dycoates" for both permanent mold and die casting use.

40. **Shell Molding Data**—"59 Answers to Your Shell Molding Problems" is the title of a booklet offered by General Electric Co. Information is given on a wide variety of shell molding problems.

41. **Small Die Castings**—A new bulletin from Gries Reproducer Corp. explains the company's unusual techniques and special facilities for producing tiny parts—finished, trimmed, ready for use—in one high-speed automatic operation.

42. **Aluminum Die Casting**—A brochure entitled "Behind the Scenes" contains a complete digest of Hampden Brass & Aluminum Co.'s experience, equipment, and facilities.

43. **Mesh Belt Furnaces**—Bulletin 454 from Harper Electric Furnace Corp. describes the higher furnace production possible with their line of mesh belt furnaces.

44. **Fluxes for Aluminum, Zinc**—A technical bulletin giving important information on fluxing procedures and improved shop practice is available from Haviland Products Co.

45. **Die Casting Alloys**—A fact-filled pocket size booklet from Henning Bros. & Smith, Inc. tells how their "Zamak" alloys meet die casters' needs.

46. **Investment Castings Design**—A brochure has been published by Hitchiner Mfg. Co. to aid the engineer in designing for the best and most economical use of investment castings.

48. **Die Casting Machine**—Bulletin 5700 from The Hydraulic Press Mfg. Co. gives complete information on a new 800-ton die casting machine, featuring complete motion control and instantaneous follow-through of a new injection end.

49. **Refractory Mold Materials**—Literature is available from Harbison-Walker Refractories Co. on mold materials that feature a uniform coefficient of thermal expansion up to 2400 F, higher fusion point, and other advantages.

50. **Furnace Refractories**—Complete technical data on refractory materials for repairing and lining melting furnaces is offered by Harbison-Walker Refractories Co.

51. **"Push-Out" Furnaces**—Bulletin 70 from Inductotherm Corp. describes their "Push-Out" furnaces with removeable crucibles which save transfer time from melting to pouring.

53. **Special Casting Problem?** — A brochure and other data offered by Investment Casting Co. are published to help solve special casting problems by using one-piece investment castings.

Continued on page 86

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P 2

P 3

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THE FOLLOWING WOULD LIKE TO GET PMM EACH MONTH:

Name _____ Position _____

Name _____ Position _____

Company _____

Address _____

_____

Major Products made at this address: _____

THIS PLANT PRODUCES TYPES OF PARTS CHECKED BELOW:

- ☐ Die Castings
- ☐ Investment Castings
- ☐ Powder Metal Parts
- ☐ Permanent Mold Castings
- ☐ Plaster Mold Castings
- ☐ Shell Mold Castings
- ☐ None of these

Please type or print clearly **MAY, 1957 do not use after 8-15-57**

Name ..... *Position* .....

Company ..... *Kind of Business* .....

Street .....

City ..... *Zone* ..... *State* .....

Please send me information and literature on items circled below.

1	18	35	52	69	86	103	120	137	154	171	188	205	222	239	256	273	290
2	19	36	53	70	87	104	121	138	155	172	189	206	223	240	257	274	291
3	20	37	54	71	88	105	122	139	156	173	190	207	224	241	258	275	292
4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
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15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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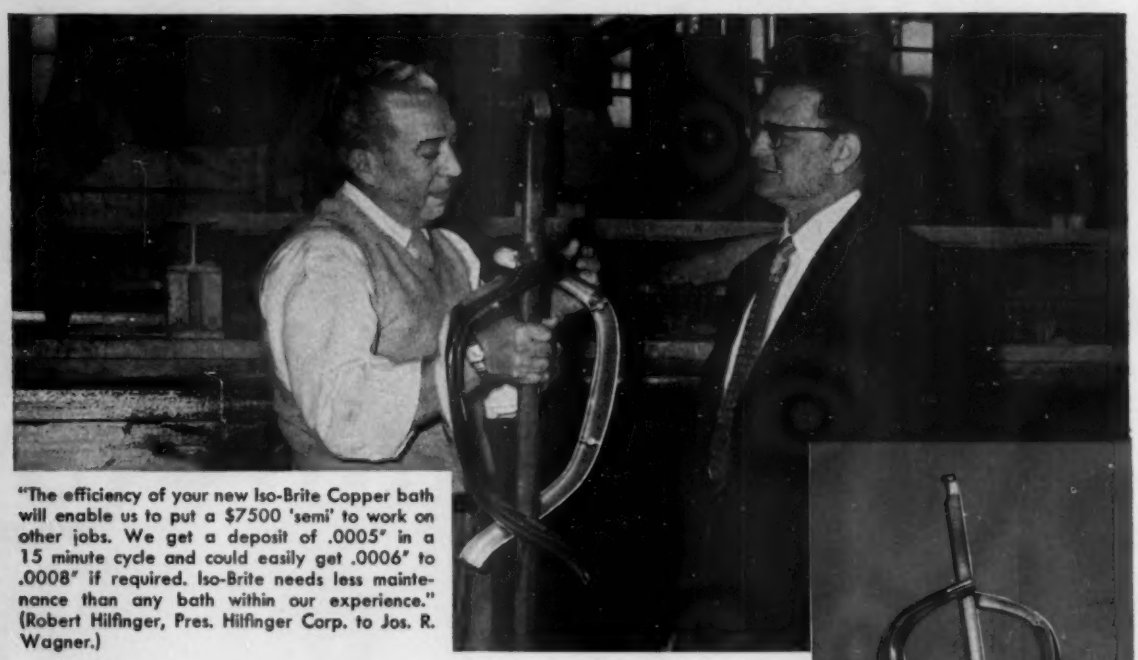
PMM

Finishing Section

The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.

"Hydraulic presses will do 75% of our trimming"
See page 67

WAGNER ISO-BRITE COPPER . . .



"The efficiency of your new Iso-Brite Copper bath will enable us to put a $7500 'semi' to work on other jobs. We get a deposit of .0005" in a 15 minute cycle and could easily get .0006" to .0008" if required. Iso-Brite needs less maintenance than any bath within our experience." (Robert Hilfinger, Pres. Hilfinger Corp. to Jos. R. Wagner.)

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CONVERSION TO ISO-BRITE ELIMINATES ONE MACHINE . . .

The record at Hilfinger Corp., Toledo, Ohio, tells a simple story. This big, 115,000 sq. ft. die casting plant with a 200-man plating department originally required two semi-automatic plating machines for plating copper before nickel and chrome on large automotive die castings. New Wagner Iso-Brite Copper bath was installed eight months ago in one tank, replacing a leading proprietary copper bath, both machines being operated by a single generator. Excessive burning of the competitive plate resulted. The single machine charged with Wagner Iso-Brite Copper now turns out Hilfinger's entire production requirement to the customer's specification, permitting the surplus semi-automatic to be devoted to other production.

If reducing finishing costs is of interest to you, consider these reasons why this new Wagner-processed chemical is making records everywhere:

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4. Fine grained, dense, ductile, fully bright
5. Freedom from roughness
6. Wide operating range—temperature 135-165°; up to 60 amperes per square foot
7. High tolerance of organic contamination

Wire, phone or write for Bulletin 70.2 for full technical information on Iso-Brite Copper and the Wagner cadmium and zinc brighteners and chromate finishes. Please pass this advertisement along to your purchasing agent or plating superintendent. The Wagner man in your area will assist you with any plating problem.

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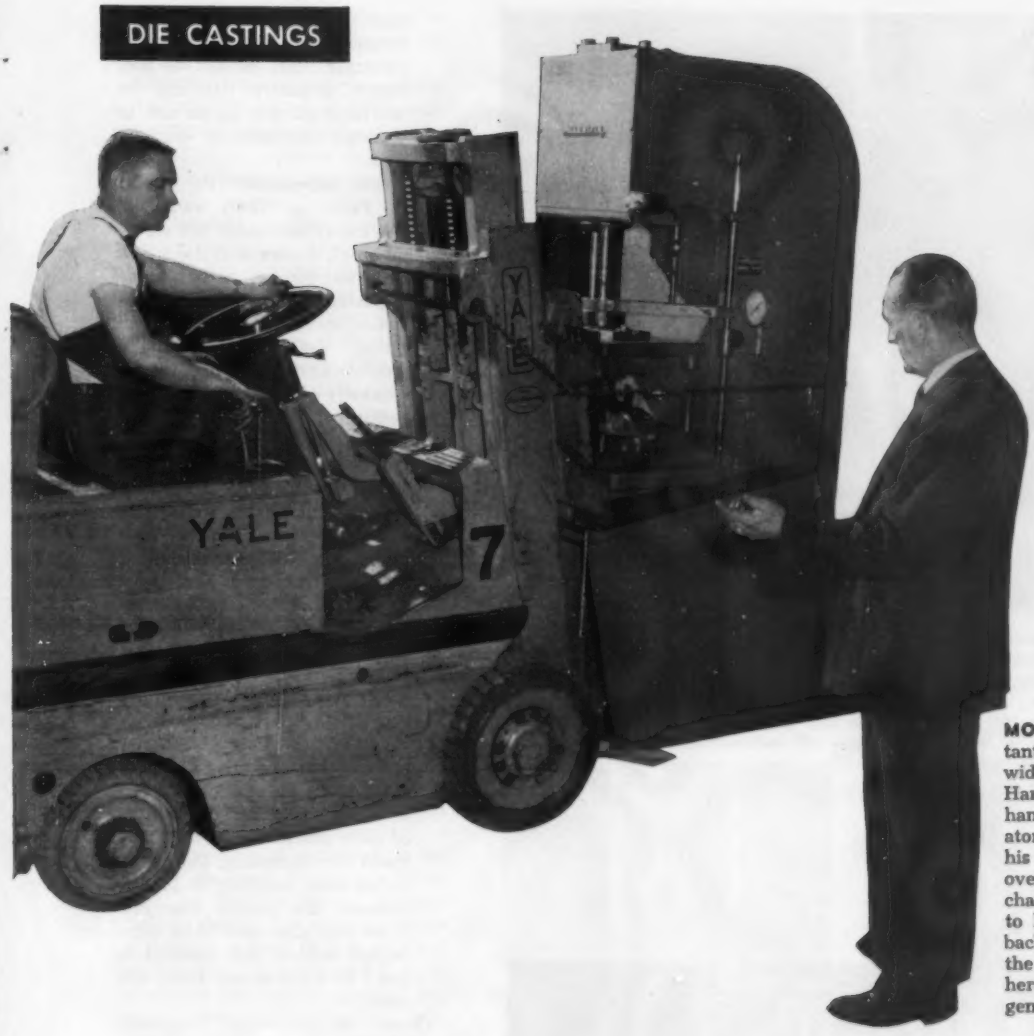


MOBILITY is an important feature. The extra wide table on this 10-ton Hannifin press comes in handy here as the operator runs the forks of his truck beneath the overhang and throws a chain around the press to keep it from tipping backwards. Directing the moving operation here is Harry Stafford, general superintendent.

Hydraulic Trim Presses For Die Castings

CAN hydraulically - operated trimming presses be used to advantage in removing parting line flash from die castings? Yes, according to Harry E. Stafford, general superintendent of the Fayetteville (N.Y.) plants of Precision Castings Company, Division of Harsco Corporation, where hydraulic trim presses have been in use for more than three years.

The development of hydraulic presses specifically to remove parting line flash has helped to create acceptance for this type of equipment. Precision Castings Co., for example, has nine 10-ton and two 25-ton Hannifin trimming presses in its Fayetteville plants, and three 10-ton and two 35-ton Hannifins at its Franklin Street plant in Syracuse. Another 35-ton unit is on order.

In the experience of this major job shop producer of die castings, more than 75 percent of its trimming work could be handled on a 10-ton press of this type. Many jobs that would ordinarily require a 25-ton mechanical press in order to get a long enough stroke, can be handled on a lighter hydraulic press, which, with 12 inches of available stroke and a total clearance between the ram and table of 22 inches, provides ample work space for a wide range of parts and dies.

Since Precision produces a great variety of die castings for many different customers, the flexibility and adaptability of these hydraulic trim presses are among the most important considerations in choosing them.

Here are some of the principal ways in which these hydraulic presses can be adjusted to meet specific job requirements . . .

• **Pressure adjustment** — By means of a relief valve, they

DEEP DIE CASTINGS can be trimmed in this type of set-up. This 25-ton hydraulic press is shown here removing flash from a large casting that would require a much larger mechanical press than this in order to get sufficient stroke for clearance. Total available stroke is 14", and "daylight" (total clearance, ram up) is 25". Ram speed on this unit is: Advance — 415 inches/minute; feed — 80 inches/minute; return — 335 inches/minute.

DIE CASTINGS WITH LARGE AREA are trimmed in this 10-ton press which is identical with the 12 other 10-ton presses in Precision Castings plants except that it has a 28" wide table to allow the trimming of bigger pieces. The differential hydraulic circuit gives these speeds: Advance — 437 inches/minute; feed — 214 inches/minute; return — 420 inches/minute.

can be operated at reduced pressure. A 10-ton press, for example, can be set to any lesser pressure during its working stroke, so as not to damage intricate or delicate dies.

- **Stroke adjustment**—By means of cams or limit switches, the rapid approach, the slower work stroke and the rapid reverse stroke can all be adjusted. By stopping the reverse stroke at any desired point, the cycle is made shorter and, therefore, faster.
- **Capacity** of the press is not directly related to the length of stroke, as it is on mechanical presses. Thus, a job that might require a large capacity mechanical press in order to get sufficient "throw" for clearance, can be trimmed on a much smaller hydraulic unit, which will exert its rated force at any desired point in its stroke.
- **Mobility** can be a factor in a die casting shop, especially one that needs to meet varying customer demands. At Precision, the hydraulic presses are moved from place to place as needed by means of fork trucks. Only requirement for operating the press in its new location is to reconnect the power line. Air lines may also need to be connected where this method is used to blow scrap from the dies.

Other factors that Precision considered in planning its trimmining press installations include: safety, quality of work, scrap removal, set-up time, maintenance and operator fatigue.

The safety factor has been built into the hydraulic action of these presses. Dual push buttons or hand levers have been provided so that the operator must keep both hands on the levers during the rapid approach stroke. If one lever is released, the ram stops automatically; if both levers are released, the ram returns immediately to its starting position.

In setting up the press, the cam or limit switch which controls the beginning of the work stroke can be positioned very exactly so that the full application of power starts at the moment the die contacts the workpiece. This not only gives maximum speed to the trimming cycle, but also makes it impossible for even the

fastest-moving operator to get a hand beneath the trim die during its work stroke.

Although sweep guards costing in the neighborhood of $300 each have been installed on all mechanical trim presses in use by Precision, the dual controls on the hydraulic presses makes these safety guards unnecessary.

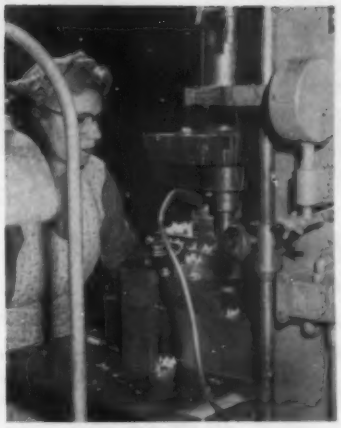
In a jobbing die casting plant, such as this, the quality of trim must be watched very closely. Since a large percentage of the castings are headed for painting or plating, the trimming must be close, clean and smooth. According to the foreman of one of Precision's trim lines, the steady pressure of the hydraulic press allows the casting to center itself properly in the die and results in clean, uniform trimming. Consequently, trim dies can often be built to closer tolerance, leaving less flash root to be polished off in subsequent operations.

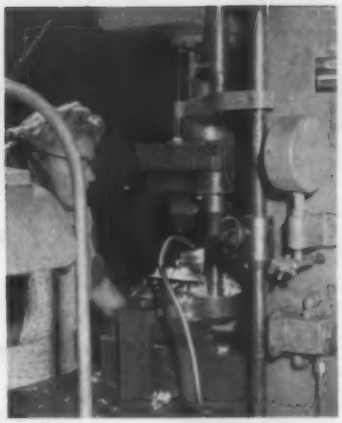
Scrap removal has been incorporated into the two sizes of presses . . . in the lighter presses, a center slot in the table allows scrap to be discharged into a tote-box below; in the larger presses, a scrap chute is provided which discharges out the back through the frame of the machine.

Set-up time is reported to be greatly reduced because adjustment of the stroke is accomplished simply by moving cams or limit switches. If it is desired to cut the reverse stroke to a minimum for faster cycling, the upper limit switch (or an adjustable rod which operates a hydraulic pilot valve) can be positioned so that the ram does not return all the way to the top. Likewise, the lower limit switch (or a cam on a shaft that is tied to the motion of the ram) can be placed to reverse the stroke at any desired point. The shift to a slower work stroke is automatic in the smaller presses, taking place when the dies encounter the work-piece. In the larger, electrically controlled presses, an intermediate limit switch is used, and this is generally set at the point which will provide the shortest possible feed stroke.

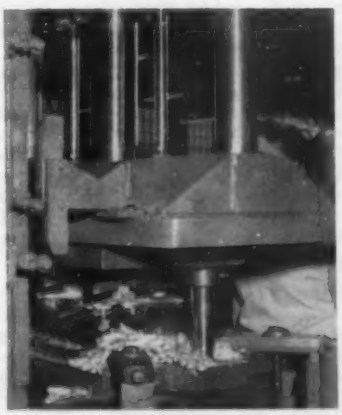
Maintenance problems are lessened in hydraulic presses because there are fewer parts which are subject to wear and friction. The type of maintenance consists principally of replacement of packings or other minor adjustments requiring little downtime. The lessened amount of pressure used to perform the work also relieves some wear and damage to trim dies . . . small punches and perforating details of a trim die that might be used for cleaning flash from a grille casting are likely to require less care and replacement when used in a hydraulic press.

The several photographs showing installations at Precision Castings die casting plants indicate the way in which these units are now being employed.





STROKE ADJUSTMENT is accomplished on this 10-ton press (shown in two views with the ram at its upper and lower limits) by means of the cam indicated by an arrow. At the left, the cam is about to actuate the small hydraulic pilot valve to reverse motion at the end of the work stroke. At the right, the ram has returned to the starting position, almost before the operator can release the levers. The full return stroke is not used in this set-up in order to speed up the trimming cycle. The set-up man has adjusted the stop at a point which allows the operator plenty of room to load and unload while reducing the cycle time. Even though the cycle could have been shortened by lowering the return stroke stop still further, the methods department felt that despite a slightly longer cycle time a larger number of parts can be processed per hour if the operator has ample room to load and unload.



GREAT SPEED IN TRIMMING is provided by this special 35-ton Hannifin press. Notice the large, guided platen and the three piston rods. The two small cylinders at the sides provide very fast advance and the large cylinder in the center provides extra power for the feed stroke. The view at the left shows the press just after the cam has passed the limit switch which starts the work stroke, and just before it strikes the lower limit switch which starts the reverse. In the view at the right, the cam is in contact with the upper limit switch which stops the reverse stroke. Approximate ram platen speeds for this press are: Downward approach—650 inches/minute; Downward feed—101 inches/minute; Return — 800 inches/minute. The ram platen measures 36" x 19" and the table 44" x 29".

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EASE OF USE—Iridite is a simple chromate conversion treatment. Fast, easy, economical. You just dip, brush or spray it on the part at room temperature. No special equipment. No specially trained personnel.

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CHOICE OF APPEARANCE—Clear coatings that retain metallic lustre to dark, maximum protection coatings. A variety of colors is available by dyeing.

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Two specially formulated finishes that give you maximum latitude in aluminum treatment. Both provide excellent corrosion protection and paint base. Iridite #14-2 is an improved product that allows greater flexibility in operation and coating thickness and produces the optimum in corrosion protection.

Either coating provides corrosion resistance superior even to complicated electrolytic treatments in a fraction of the time. These coatings also offer many other valuable characteristics: they have low electrical resistance, they aid in arc-welding, provide a good base for bonding compounds, have no effect on the dimensional stability of close-tolerance parts. Final appearances ranging from clear through yellow iridescence to full brown can be obtained. By dyeing, you can produce red, green, blue, orange or yellow finishes.

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Produces a protective, paint base film with corrosion resistance at least equal to that obtained from long, high-temperature dichromate treatments in a fraction of the time and at room temperature. The appearance of the coating can be varied from light brown to dark brown and black.

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CHARLES F. RADLEY RETIRES

Charles F. Radley, one of the original directors of Oakite Products, Inc., has retired from active duty as director of publicity and member of the company's board of directors. He is, however, continuing in the employ of the company as a consultant on advertising, public relations, and general management policy.

Employed in 1917 as editor of *Oakite News Service*, the firm's external publication, Mr. Radley was elected to the board of directors of Oakite Products, Inc., in 1926, when that company was organized as successor to the original Oakley Chemical Co. He was appointed director of publicity in 1927. For the past thirty years he has been responsible for Oakite's entire industrial advertising program, including trade publications, exhibits, direct mail, literature, and printing.

NEW VACUUM MELTING FACILITY

Newest entry in the rapidly expanding field of vacuum melting is the Vaculloy Corp. of Wooster, Ohio, organized recently by James H. Johnston and Edward R. Funk. Both Johnston and Funk have had extensive experience in the melting and fabrication of titanium, steel, and alloys through their initial entry in the titanium field via the Johnston and Funk Titanium Corp., also of Wooster, one of America's pioneer producers of titanium wire.

The new firm is currently engaged in custom vacuum melting of titanium, steel, and other alloys for research, laboratory, and development purposes.

Officers of the Vaculloy firm point out that the present demand for less weight and more strength in metals has given vacuum melting an unprecedented impetus.

LETTERS

continued from page 28

cation has been made for this composition, and anyone desiring to produce the alloy should direct his request to Dr. M. G. Fontana at Ohio State University.

Furthermore, your article implies that this new alloy was developed for investment casting. While it is true that most stainless alloys used in sand casting also lend themselves to investment casting, one cannot necessarily assume that all alloys suitable for one process are also suitable for the other. The CD-4MCu alloy was developed for sand castings, and information has not been obtained as yet on its characteristics in investment cast form.

We appreciate your cooperation in bringing these facts to the attention of your readers.

E. A. Schoefer
Executive Vice President
Alloy Casting Institute
Mineola, New York

FOUNDRY EQUIPMENT SERVICE

We are considering setting up a small foundry for Plaster Mold Castings. If possible could you furnish us with a list of sources where we might get any information, such as material specifications, equipment required, etc. —E.P.B.

The desired information has been sent E.P.B.,—Ed.

QUALITY CONTROL GROUP FORMED

Vanadium-Alloys Steel Company has established a Metallurgical Quality Control Group as part of a recent reorganization for the Metallurgical Department designed to more effectively handle the technical problems of tool steel users.

R. A. Cary was named to head the new group which will furnish a closer liaison of metallurgical control over the company's production.

The Metallurgical Quality Control Group will have complete responsibility for customers' specifications, the application of these specifications to orders, instructions for plant processing, control and inspection. All special mill instructions will be supervised by the group.

SOME DIE CASTING ALLOYS MADE OBSOLETE

ASTM Committee B-6 on Die Cast Metals and Alloys meeting at the Annual Committee Week approved the deletion of two aluminum base alloys and a zinc base alloy from ASTM specifications covering die castings. They also recommended that a magnesium base alloy be dropped.

Aluminum base alloys SC54A and SC54B are no longer used since they have been replaced by better alloys. The use of zinc base alloy AC43A and magnesium alloy AM100B were dropped also since they are not as stable as other alloys.

Some of the most significant results of the meeting were final discussions concerning specification B86 covering zinc base die castings. Changes contemplated in the specification include raising the maximum copper limit in alloy AG40A from the present 0.15 to 0.25 percent and the addition of a footnote stating that copper in the range of 0.25 to 0.75 percent will not affect the serviceability of these die castings in the majority of commercial applications. In process is a note of warning stating that alloy AC41A should not be subjected to prolonged exposure to temperatures above 200 degrees F.

Committee B-6 is concerned with all non-ferrous alloys used in casting or dies under pressure other than gravity. It has proposed studies into the formulation of specifications and methods of tests, finishing properties, corrosion resistance of die casts and the art of die casting.

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For more information circle No. 81 on the Reader Service Card

SEL-REX CORPORATION CONTINUES EXPANSION

The acquisition, on long term lease, of a two-story brick building encompassing approximately 40,000 square feet, in Nutley, New Jersey has been announced by Sel-Rex Corporation, manufacturers of Precious Metals Processes, Metallic Power Rectifiers, Airborne Power Equipment, Liquid Clarification Filters, and Metal Finishing Equipment and Supplies.

According to Morris M. Messing, Sel-Rex President, the new building will house the firm's executive offices, Rectifier and Filter manufacturing, Precious Metals Production and Experimental Laboratories, and a complete Pilot Plant for sample Precious Metals electroplating.

SPECTROGRAPHIC PLANNING SURVEY ANNOUNCED

A new program to aid industrial firms in selecting the correct spectrographic equipment for their needs has been announced by the Bausch & Lomb Optical Co., Rochester, N.Y.

Under the plan, known as the Analytical Planning Survey, spectrographic experts will make a complete study of a firm's requirements and recommend suitable equipment on the basis of their findings.

Because of the wide differences in the degree of dispersion, resolution and photographic speed offered by various types of spectrographs, selection of equipment must be related closely to the intended use if top efficiency is to be realized, B&L points out.

LATROBE STEEL COMPANY NAMES NEW VICE PRESIDENT-METALLURGY

Latrobe Steel Company, Latrobe, Pa., has announced the promotion of Stewart C. Fletcher to the position of Vice President-Metallurgy.

In his new position, Dr. Fletcher will be responsible for all Metallurgical activities concerned with the products manufactured by Latrobe Steel Company.

Dr. Fletcher has been connected with research and development work on tool steels and allied materials for over fifteen years. After a brief time at the Aluminum Research Laboratories following graduation in Metallurgical Engineering at Carnegie Tech, he entered Graduate School at Massachusetts Institute of Technology in 1939 on a teaching fellowship. This led to the degree of Doctor of Science in Metallurgy, with his major research being on the tempering of tool steels.

In 1945 Dr. Fletcher became associated with Latrobe Steel Company as Chief Research Metallurgist, in 1947 was appointed Chief Metallurgist, and in 1956 became Director of Metallurgy.

DR. PETER HIDNERT RETIRES

Dr. Peter Hidnert, a well-known expert in the field of thermal expansion, retired March 31 after 45 years of service at the National Bureau of Standards.

Dr. Hidnert has been active in the study and development of low-expanding alloys and thermostatic devices depending on thermal expansion. His studies of the structural changes occurring in metals under varying temperature conditions have been of particular importance in developing high temperature, high strength alloys used in jet and rocket engines.

SIMPLE WAY TO CUT MACHINING COSTS

-often in half!

Suppose it takes x-seconds to machine a part. 3x-seconds to get the part to and from the machine tool. Cut 1x-second off handling time—you've cut machining costs in half

Obvious, you say.
The trick is how.

Here's one way: Install a Bellows Rotary Work Feed Table. Your operator loads at one station while machining goes on at a second, parts are ejected at a third. The table is adjustable to position 4, 6, 8, 12, or 24 stations. It is air-powered electrically-controlled. The ten inch diameter table top can be drilled and tapped for mounting jigs and fixtures or for mounting oversize table tops. The table can be synchronized to the movement of drill press spindles or press rams. It is inexpensive to buy, inexpensive to install and can be readily moved from one machine to another. Simplest way you ever saw to save money in many machining operations.

Write for these free booklets

Describes the full line of Bellows Rotary Work Feed Tables and Bellows Index Tables: permissable loads, positioning speeds, positioning accuracy. Ask for Bulletins RT-1022 and RT-1326. Address Dept. PMM 557 The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

The Bellows Co.
AKRON 9, OHIO

MANUFACTURERS OF "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

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NAME YOUR NEED

"Honite" Barrel Finishing Compounds fill it perfectly

"I need a fast cutter"

The fastest and cleanest cutting compound available is "HONITE" 392. With its aluminum oxide base and high foam action it is ideal for aggressive burring and surface cutting. High cushion provides good cleansing action. Mildly alkaline.

"HONITE" 392

One of the complete line of "HONITE" compounds

"I'm working with hard steel"

The best compound for long runs, especially on hard steel, is "HONITE" 332. It should also be used where a cleaning action is necessary. A coarse (180 mesh) silicon carbide abrasive base compound that cuts fast and long. Mildly alkaline.

"HONITE" 332

One of the complete line of "HONITE" compounds

"I want a fine finish"

For the very finest finish, the best compound to use is "HONITE" 334. A fine (600-1000 mesh) silicon carbide abrasive base, it's light colored, designed for long cycle use. Ideal for surface refinement and finishing to close tolerances. Mildly alkaline.

"HONITE" 334

One of the complete line of "HONITE" compounds

"I need a dual purpose compound"

The best dual purpose compound—for surface cutting and fine finishing—is "HONITE" 302. Contains coarse abrasive for initial cut down which disintegrates into a mass of fine abrasive (-600 mesh). Gives an excellent semi-luster finish.

"HONITE" 302

One of the complete line of "HONITE" compounds

"I want cut, color and foam"

This unique combination of properties is found in "HONITE" 366, designed for surface cutting and polishing. Acts as a surface cutter for the first 4 or 5 hours then begins a coloring action *together* with strong foaming action. Mildly alkaline.

"HONITE" 366

One of the complete line of "HONITE" compounds

---WANT MORE INFORMATION?---

Minnesota Mining and Manufacturing Co.
Dept. FF-57, St. Paul 6, Minnesota

☐ Send me full information about "HONITE" barrel finishing compounds

☐ I'd like to talk with a "HONITE" Field Engineer

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COMPANY.....

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Honite

Made in U.S.A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City.

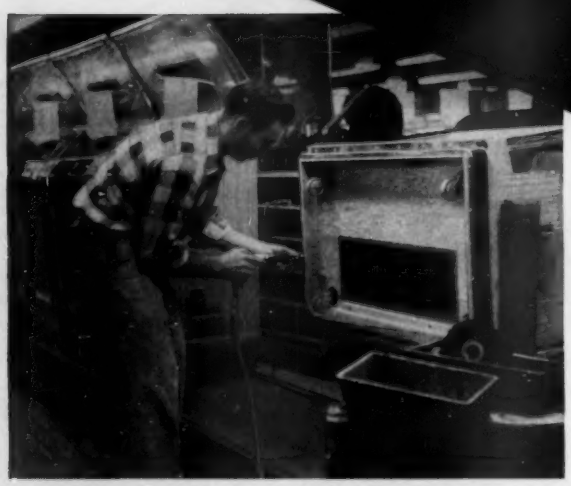
PRODUCT OF 3M COMPANY RESEARCH

For more information circle No. 92 on the Reader Service Card

Seeburg designers choose P-K® screws

to match the fastener to the job!

Joseph Kamys, engineer, J. P. Seeburg Corporation, Chicago, manufacturers of coin operated phonographs says, "Seeburg standards demand attention to every detail—quality workmanship and materials throughout. With Parker-Kalon screws, we can match the fastener to the specific application—be sure of dependable results."



Attachment of metal base molding and kickplate to a Seeburg cabinet, in a metal-to-wood application. "Rather than use ordinary wood screws, we power-drive P-K Self-tapping Type-A," says Mr. Kamys. "Holding power is far better, there's less chance of wood splitting, and fewer rejects at inspection."

Here, metal rims of two high-frequency speakers are fastened to a formed, one-piece, plastic housing. "In this metal-to-plastic application we have not only the problem of possible plastic breakage, but the fastener used must be highly resistant to vibration. We find P-K thread-forming Type-Z screws highly satisfactory."

If you are designing a new product or new model, it will pay you to talk with a Parker-Kalon Field Engineer. He can help in the selection of proper fasteners, can often suggest ways to speed production—cut costs. You can contact him through your local Parker-Kalon Industrial Supply Distributor.

PARKER-KALON DIVISION, General American Transportation Corporation, Manufacturers of Self-tapping Screws, Socket Screws, Screwnails, Masonry Nails, Wing Nuts and Thumb Screws.

Sold Everywhere Through Leading Industrial Distributors. Factory: Clifton, New Jersey—Warehouses: Chicago, Illinois, Los Angeles, Calif.

PARKER-KALON®
fasteners

For more information circle No. 97 on the Reader Service Card

C. L. LAWRENCE JOINS LITEMETAL DICAST, INC.

Announcement was recently made by R. C. Cornell that Cloyd L. Lawrence has been appointed sales supervisor for Litemetal Dicast, Inc.

C. L. Lawrence

Mr. Lawrence has had many years of experience selling castings in the Ohio, Indiana, Illinois, Michigan territory and will cover the same area for Litemetal Dicast. His functions will be as a contact with customers that are not presently served by the company representatives in that area.

It is felt that Mr. Lawrence's wide knowledge in the field of application of light metal castings will be of very material service the users and potential users of aluminum and magnesium die castings.

STAUFFER DEVELOPS NEW TITANIUM PROCESS

Stauffer Chemical Company has revealed the development of a promising new process for production of titanium metal. The disclosure is the first public announcement of Stauffer's interest in this field.

According to the report, the process has reached the final stages of pilot plant development. While details of the process have not been disclosed, the Company has released the following statement:

As the result of over three years of developmental work, titanium sponge is being produced experimentally from titanium subchlorides which are, in turn, produced from titanium tetrachloride. As a major commercial supplier of titanium tetrachloride, Stauffer Chemical has an important interest in developing new processes to upgrade this material. The Company's recent announcement regarding its ability to supply titanium trichloride in commercial quantities is consistent with this objective.

On the basis of results obtained to date it appears that the new process may be applied also to the production of other metals, such as columbium, tantalum and zirconium.

R. W. RUDDLE JOINS FOUNDRY SERVICES, INC.

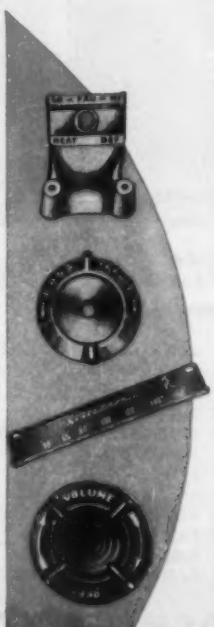
The appointment of R. W. Ruddle as technical manager of Foundry Services, Inc. was recently announced by Fred Eastwood, vice president and general manager of the Columbus, Ohio firm. Mr. Ruddle will be in charge of all technical service, research and development carried out in Foundry Service's laboratories.

R. W. NAUS APPOINTED SALES MANAGER OF PRESSCO

Raymond W. Naus has been appointed sales manager of Pressco Casting and Mfg. Corp., according to an announcement from W. P. Hodgkins, president. At the same time the appointment of Ben Pethe as chief draftsman under W. J. Brinkman, vice president for engineering, was announced.

wiping the same part →

More than 11 times faster— and much better— with the Fin-E-Co Automatic Paint Wiper.



The operator loads, presses pedal, and the machine does a perfect job.

Wiping is done by a continuous roll towel, which may be laundered and re-used. The part is either rotated, oscillated or reciprocated as the towel wipes it. Every part comes out *clean.*

No skill required. The *biggest* savings are made on the *really tough* wiping jobs.

Quick setup— usually changed to a new job in 10 or 15 minutes. Can be located anywhere, and moved wherever needed.

Send us a sample part, and we'll tell you the production you can get with the Fin-E-Co Paint Wiper.

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1115 Cherry Street, Erie, Pa. Phone 5-4478

For HIGH PRODUCTION Decorating, write for Catalog on our Painting Machines • Spray Masks • Multifit Clamps • Mask Washers

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Decorate the way that's best today

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For more information circle No. 114 on the Reader Service Card

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We can reduce your costs and improve your product with the advantages of the powdered metal process. Our modern plant and technical facilities are at your disposal to meet your most exacting parts requirements. Your inquiry is solicited for study and quotation.

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937 Howard Ave., Lancaster 10, Pa.

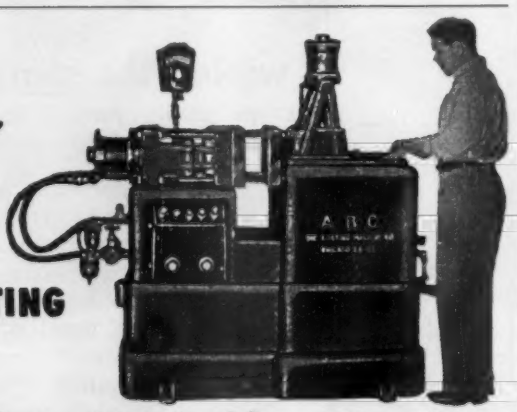
TYPICAL PARTS:

Gears, pinions, cams, ratchets, bearings and bushings, machine and structural parts.

SPECIAL, high speed rotary presses available for high quantity, small part production

NEW!

HIGH SPEED A.B.C. DIE CASTING MACHINE



Free Cycles Over 1000 Shots Per Hour

Here's the new A·B·C high speed, low cost die casting machine which eliminates costly production of small die castings on large die casting machines. Air operated, the machine produces small non-porous lead, tin and zinc alloy precision die castings up to 1½ lbs.

The A·B·C is economical to operate and easy to set up. Its lightning production speeds makes single cavity molds practical and profitable.

STANDARD EQUIPMENT INCLUDES:

- 4 TIE BARS
- AUTOMATIC TIMING
- CALIBRATED TEMPERATURE GAS CONTROL
- GAS BURNERS
- DIE BLOCKS
- AIR REGULATOR
- FILTER
- OILER
- SAFETY SHOT INTERLOCK

Write today for engineering data and prices. Ask for bulletin A-10.

A B C DIE CASTING MACHINE CO.

400 E. 142nd ST. • DOLTON, ILL.

For more information circle No. 2 on the Reader Service Card

PERMANENT MOLD DIE CO. EXPANDS

John W. Wall, president of the Permanent Mold Die Co., Inc. has announced an expansion of the firm's facilities, and a new location for their extrusion die operations at 5749 Beebe Avenue, Warren, Michigan. The new extrusion die plant will be called, The PMD Extrusion Die Company, while Permanent Mold Die Company Inc. will retain its present location at 2275 East Nine Mile Road, Hazel Park, Michigan.

CONSOLIDATED ELECTRO DYNAMICS NAMES J. G. HIXSON MANAGER

Appointment of John G. Hixson as manager of technical services, Rochester Division, Consolidated Electrodynamics Corporation, was announced by Frank M. Jenner, division general manager.

Hixson joined Consolidated in 1952 as a physicist. Since November of last year he has been staff assistant to the division's director of engineering.

Hixson holds a B.A. in mathematics and physics from Hobart College and a master's degree from the University of Rochester. He is a Phi Beta Kappa.

A & C ANNOUNCES NEW SALES MANAGER

Milo L. Phillips has been appointed Sales Manager of Alloys & Chemicals Manufacturing Co., Inc., Cleveland, Ohio, it was announced by N. L. Butkin, President.

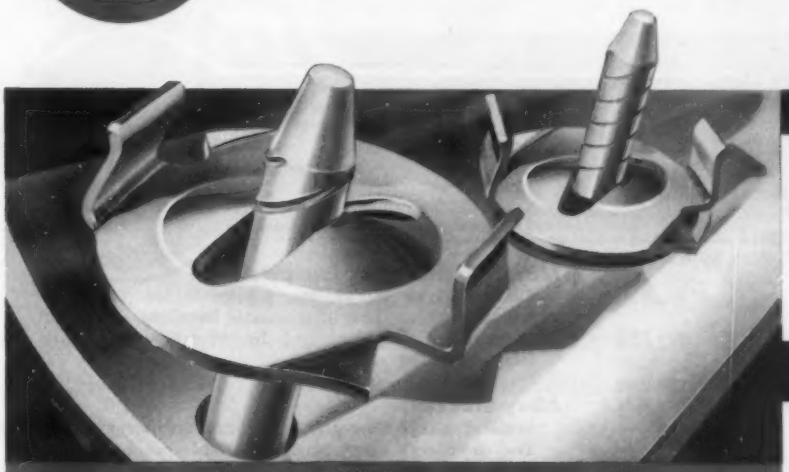
Mr. Phillips graduated with an engineering degree in Chemistry and Metallurgy from the University of Minnesota. He began his career with the Aluminum Company of America as a Metallurgist, and was subsequently in production relating to the Castings Division. He was later trained in Die Casting, and promoted to a Casting Specialty Salesman in Chicago. After completing ten years with Alcoa, he left to accept a position with the Wm. F. Jobbins Company in a Sales Supervisory and Foundry Consultant capacity.

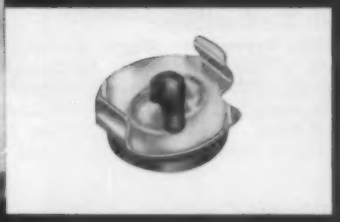
Mr. Phillips joined Alloys & Chemicals Manufacturing Co., Inc., in March of 1956 as a territorial salesman.

Mr. Butkin stated, "With the appointment of Mr. Phillips, we look forward to expanded markets and increased service to all our Customers."

DOT THREAD CUTTING FASTENER
HOLDS TIGHT TO CURVED SURFACES

- Low Cost
- Re-Usable
- Self-Locking
- Vibration-Proof
- Spring Take-Up



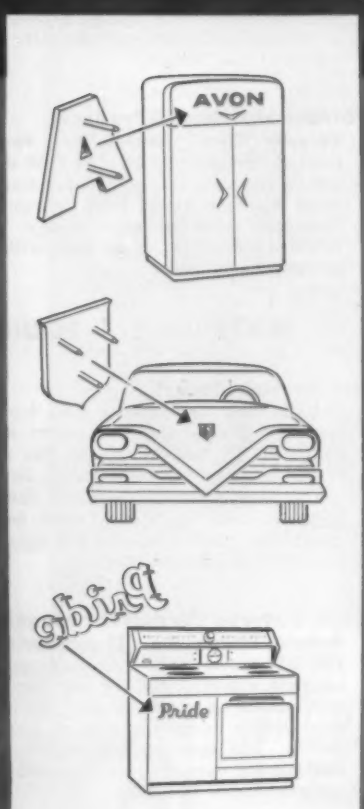


Specially designed to hold die-cast or cold-forged name plates, emblems and trim against sheet metal surfaces . . . DOT'S unique T.C.F. can be used in many other applications which require a spring take-up fastener that pulls up tight without backup on flat or contoured surfaces.

It cuts clean, deep threads on unthreaded studs, even those that are chrome plated. When used with its preassembled plastic sealer, T.C.F. makes a water-tight seal. The sealer *precedes* the fastener onto the stud so that it is not damaged by the thread-cutting process.

Available *in quantity*, with or without sealer, to fit 1/8" and 3/16" studs. Drawings available on request for magnetic tool or simple hand tool.

Nominal Sizes	A	B	C	D	E	F	Driving Torque	Ultimate Strength
1/8"	.560	.170	.450	6°/4°	.095 .085	.130 .125	7-10 inch lbs.	200 lbs.
3/16"	.705	.200	.450	6°/3°	.160 .150	.192 .184	20-30 inch lbs.	400 lbs.



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DOT T.C.F.
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Cambridge, Mass.

UNITED-CARR FASTENER CORPORATION

For more information circle No. 99 on the Reader Service Card

USEFUL LITERATURE, CATALOGS, MANUALS

any of these technical publications may be obtained by circling the appropriate numbers on the Reader Service Cards, Pages 64-65

PMM PROCESSES

Small Die Castings: 154

Gries Reproducer Corp., 8-page technical bulletin. The company's exclusive facilities for the production of small zinc die castings—"smallness unlimited"—are described and illustrated. Included is a design engineers' checklist of important factors to consider when designing small parts for die casting.

Investment Castings: 155

Austenal Laboratories, Inc., 10-page bulletin. The company's "Microcast" process of investment casting is described with step-by-step photographs. Included is a two-page table of representative properties of investment cast alloys.

Powder Metallurgy Products: 156

Chrysler Corp., Amplex Div., 48-page engineering manual. Engineering Manual E-56 describes the company's complete line of self-lubricating bearings, finished machine parts, and permanent metal filters. Complete information on design, applications, and physical properties are included, with numerous photographs, charts, and graphs.

MATERIALS & EQUIPMENT

Hot Runner Blocks: 157

Detroit Mold Engineering Co., 4-page bulletin plus engineering data sheet. A recent issue of the company's "DME News" discusses the use of hot-runner blocks in large injection molds. Several photographs and a large schematic drawing illustrate the various approaches to hot-runner mold design. Included is engineering data sheet No. 110 giving a table of core diameters for driven studs.

Cast, Sintered Permanent Magnets: 158

General Electric Co., 12-page catalog. Catalog No. PM-121 covers both cast and sintered permanent magnets manufactured by the company. It includes information on magnetic and mechanical properties, approximate tolerances, magnet assemblies, sales and service, and ordering instructions. Illustrations and engineering data provide important information for various shapes available.

Spectrochemical Analysis: 159

Jarrell-Ash Co., 28-page technical brochure. Bulletin No. CH401, the first in a series of five publications dealing with various aspects of spectrochemical analysis, describes the basic fundamentals of the process. Published by Hilger & Watts Ltd. of England and distributed in this country by Jarrell-Ash, the comprehensive brochure outlines in detail the methods, instruments, and accessories used in all phases of spectrochemical analysis, and includes examples of typical analytical problems, suggested laboratory floor plans, plus information on special purpose instruments.

Melting Furnaces: 160

International Foundry Supply Co., two 4-page bulletins plus price and specification sheets. Four models of melting furnaces for copper, brass, bronze, or aluminum are described and illustrated. Advantages of the non-crucible design are discussed, and complete specifications and prices are given.

Materials Handling Equipment: 161

Elizabeth Iron Works, Inc. 6-page folder. The company's complete line of materials handling equipment is described and illustrated. Included are ramps, pallets, and pallet stackers.

Alloy Stocks: 162

WaiMet Alloys Co., stock sheet and engineering data. The company's latest stock list gives specifications of alloys now available plus a list of tool and constructional steels available. Included is an engineering data sheet on WaiMet alloy 25-5PH, giving chemical composition, mechanical properties, and test data.

Thermocouple, Extension Wire: 163

Claud S. Gordon Co., single-page bulletin. Bulletin No. 1200-1 describes a newly developed bonded staple yarn insulation for use on thermocouple wires and thermocouple extension wires at temperatures up to 1600F. Advantages of the yarn are listed, and specifications on four sizes of wire are given.

Aluminum Products: 164

Reynolds Metals Co., 18-page reference bulletin. A condensation of the company's 1957 Mill Products Catalog, this bulletin is intended as a convenient reference guide for preliminary discussion of design and fabrication problems. Included is information on fabricating and finishing aluminum products, revised and clearer weight charts for casting alloys, and a selected list of company literature and films.

Hydraulic Press Maintenance: 165

Lake Erie Machinery Corp., 14-page bulletin. Bulletin No. 155 contains hydraulic oil data and a lubrication guide for hydraulic press users. Topics include supervision of hydraulic systems, preventive maintenance, standards for hydraulic oils, and special lubrication considerations.

Powder Classifier: 166

The Sharples Corp., 10-page technical bulletin. Bulletin No. 1280 describes an air vortex classifier for all types of powder. The air vortex principle of classification is described, and a large cut-away view and diagrams illustrate the machine's operation. Advantages of this system and typical applications are also discussed.

Turbo-Convection Ovens: 167

L & L Mfg. Co., two technical data sheets. Six models of the company's line of turbo-convection ovens are described and illustrated. Complete specifications and prices are given, additional equipment available is listed and applications are discussed.

Continued on page 80

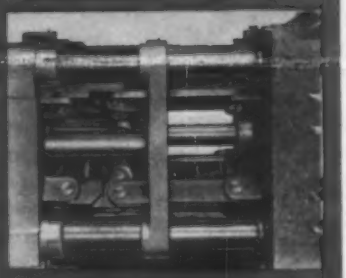
Your Good Judgment is Confirmed When You Buy . . .

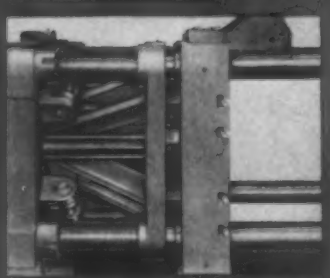
B&T DIE CASTING MACHINES

In many industrial centers you'll find leading die casters using B&T die casting machines — purchased by smart production men who, having carefully investigated and compared, choose them in preference to all others. These men know that for castings of extreme accuracy, excellent density and finish, B&T Die Casting Machines can not be beat. And, furthermore, that they'll give you top production with a minimum of maintenance.

13 MODELS thoroughly proved by many years of actual service — ranging in capacity from 100 to 750 tons — for zinc, aluminum and brass. EACH DESIGNED AND BUILT TO THE SPECIFICATIONS OF PRACTICAL DIE CASTERS AND DEVELOPERS OF DIE CASTING MACHINES WITH OVER 35 YEARS OF EXPERIENCE.

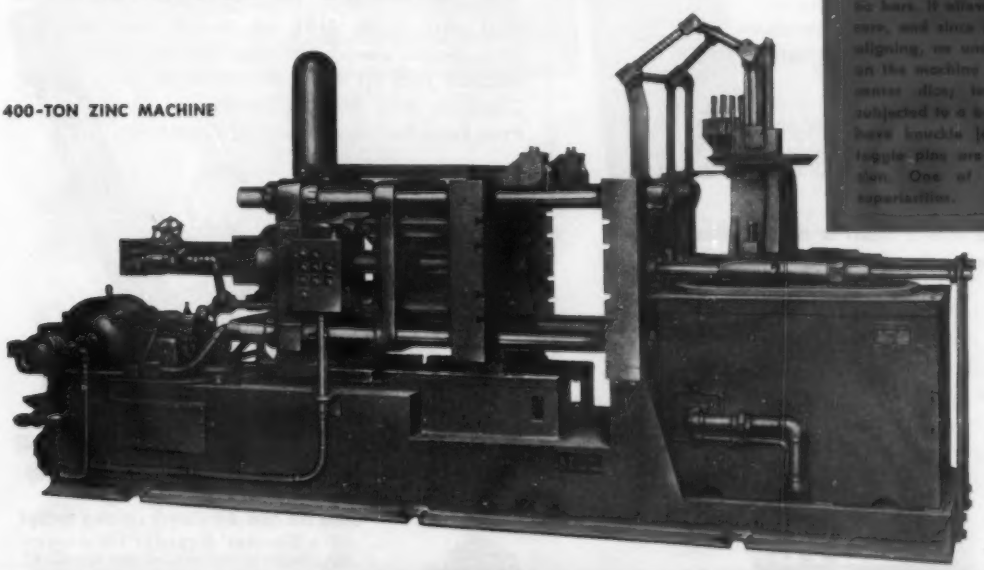
THE *Only* DIE CASTING MACHINES *with* 4-TOGGLE, SELF-ALIGNING LOCK-UP . . .





The 4-toggle linkage, an exclusive B&T feature, locks directly under the tie bars. It allows high locking pressure, and since the toggles are self-aligning, no undue strain is exerted on the machine when operating off-center duty. Toggle pins are not subjected to a bending load. Toggles have knuckle joints so the pivoted toggle pins are placed in compression. One of many definite B&T superiorities.

400-TON ZINC MACHINE



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B&T MACHINERY COMPANY 301-317 EIGHTH ST. HOLLAND, MICHIGAN PHONE 2341

BUSS PRECISION

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When tough finishes resist your present stripping methods, you may need help on some of these problems:

1 How to strip oil-base paints... synthetic enamels.. alkali-resistant plastics... resin-base paints... japans... wrinkle finishes... nitrocellulose lacquers ...alkyds... phenolics... ureas.

2 How to strip zinc chromate primers without etching aluminum.

3 How to strip paint from vertical surfaces and undersurfaces where thin-bodied strippers run off without doing their work.

4 How to strip metal parts that are too large to be soaked in tanks.

5 How to strip paint, pigment residues, phosphate coatings and rust in one operation.

6 How to strip paint from rejects, conveyor chains, racks and hooks in continuous operation.

Oakite has more than a dozen fine stripping materials for these and similar jobs.

FREE For information on problems 1, 2, 3 and 4 ask for a copy of "How to STRIP PAINT". For more on problems 5 and 6 ask for "Here's the best shortcut in the field of organic finishing". Write to Oakite Products, Inc., 34G Rector St., New York 6, N. Y.

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For more information circle No. 95 on the Reader Service Card

Core Binders: 168

Archer-Daniels-Midland Co., Foundry Products Div., 6-page bulletin. Bulletin No. 450 describes the company's "Linoil" line of core binders which has been recently expanded to include all core-making systems. Performance characteristics and application information are given in detail.

Die Casting Dies: 169

Damen Tool & Engineering Co., single-page bulletin. The company's equipment and facilities for designing and building plastic molds and die casting dies are described and illustrated.

Millivoltmeter Pyrometers: 170

General Electric Co. Complete information is available on a new line of small millivoltmeter pyrometers, called the HP-30 series. Used primarily for temperature control, the new pyrometers can also be used to measure other process variables such as speed, vacuum, density, and electrical quantities.

Single Solenoid Valve: 171

Valvair Corp. Full information is available on a new miniaturized pilot-operated 4-way valve, designed for control of small double-acting cylinders and similar devices.

FINISHING

Automatic Spray Painting: 172

The DeVilbiss Co., 12-page catalog. Four types of automatic transverse spray painting machines are covered in an illustrated catalog. Models and specifications of the horizontal and vertical straight line types are included, with typical uses. Contour ma-

More per hour with MEAD

WORK FEEDERS

Feed work fast to drill, tap, broach, mill. Delivers, holds, ejects stampings, castings, screw machine parts up to 3"—thousands per hour. Combines with MEAD Timers and Drill Press Feeds for easy, cost-saving automation.

Send for new Air Power catalog today!
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SPECIALTIES COMPANY
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PATHFINDER IN AIR POWER AUTOMATION

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chines in both horizontal and vertical types, which are built to order, are also described.

Protective Coatings, Linings: 173
Metalweld, Inc., Protective Coatings Div., technical brochure. A comprehensive brochure discusses types of protective linings and coatings, their importance, when and how they should be used. One section is devoted to porosity, and the suitability of a protective system to its environment is also covered.

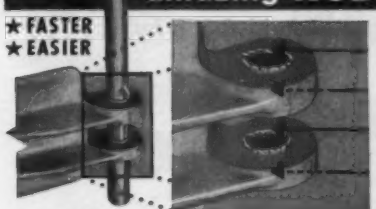
Color Anodizing Control: 174
Sandoz, Inc., 10-page booklet. Steps for setting up a laboratory control procedure for checking color anodizing work are explained. Factors which cause variations in color, importance of sealing bath control, sampling technique, and dye concentration, are among the subjects discussed. Mathematical formulae for various calculations are included.

Drill Press Catalog: 175
Rockwell Mfg. Co., Delta Power Tool Div., 12-page illustrated catalog. The company's complete line of drill presses is described and illustrated. Specifications are given for floor and bench, single and multiple spindle models in several basic sizes. The use of these drill presses to supplement or replace heavier and more expensive machines is also discussed.

Lightweight Air Sander: 176
Sundstrand Machine Tool Co., Magnetic-Pneumatic Div., single-page bulletin. Description and specifications of the lightest weight air sander on the market are given in Bulletin No. 800. The unit weighs three pounds, yet is claimed to have the power and capacity to do even the toughest production sanding jobs.

HOW TO.... DEBURR THESE INACCESSIBLE HOLE FACES BY MACHINE OPERATION with the amazing NOBUR TOOL

★FASTER
★EASIER



No more hand finishing methods for those hard-to-get-at inner surfaces on multi-wall parts. The NOBUR Tool with its double edge cutting blade does the job in seconds . . . all by **machine operation.** Can be used by anyone, with complete safety, on your own lathe, drill press, etc. Simple to operate.

1 Insert NOBUR tool in any machine spindle. A light pressure of the revolving cutter blade against the workpiece quickly deburrs the outside surface.

2 After outside surface is deburred, slide knurled sleeve back to fully retract the cutter-blade below pilot body diameter.

3 With cutter-blade retracted move workpiece or tool to position for deburring inside surface. Raise cutter-blade to deburr first one surface then the other.

Write for FREE Folder
Send for all details on Nobur Tool Products TODAY!

N-11

NO/BUR TOOLS **NOBUR** MANUFACTURING CO.
6860 Farmdale Ave., No. Hollywood, California

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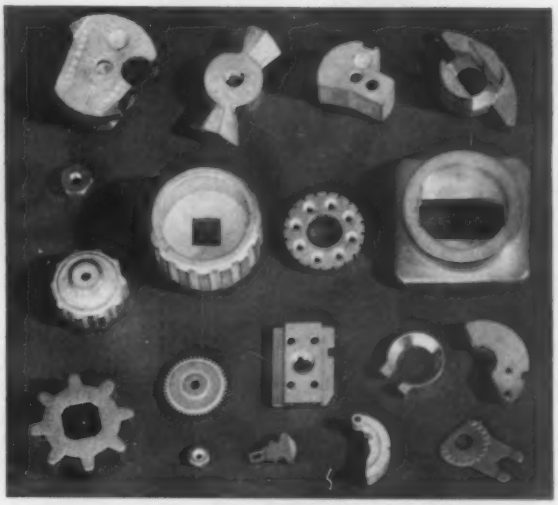
MEETING DESIGN NEEDS

Even greater savings in product costs are possible with
BRASS AND NICKEL SILVER POWDERED METAL PARTS



Very substantial savings are being realized by manufacturers who have turned to powder metallurgy for structural and functional parts. In each case, use of the metal powder process was justified by cost comparison with a previous method of meeting design needs.

Even greater economies could have been achieved by these manufacturers if sinterings had been used initially. Immediate savings over other possible methods are much greater when the high cost of original tooling and the cost of conversion can be avoided.

When designing a new product, first investigate the use of BRASS AND OTHER NONFERROUS POWDER PARTS. Consult a Powdered Metal Fabricator and take advantage of his experience in cost-saving production methods.

How Can BRASS AND NICKEL SILVER POWDER PARTS Meet Your Design Needs?

For detailed information on the design, properties, production and application of brass and other nonferrous powder parts you should have a copy of our manual. It will give you 20 case histories of brass and nickel silver powder structural parts to assist in evaluating this means of production in terms of your particular needs.

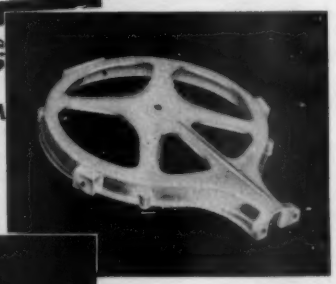
SEND FOR YOUR COPY

THE NEW JERSEY ZINC COMPANY
160 Front Street New York 38, N. Y.

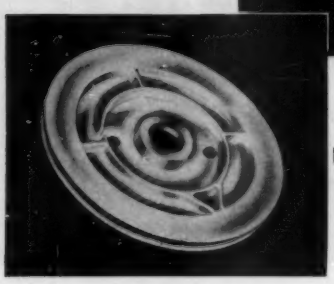
For more information circle No. 68 on the Reader Service Card

ALUMINUM DIE CASTINGS for OUTBOARD MOTORS

—Important Factors In Their Increasing Popularity



DIE CAST ALUMINUM OUTBOARD MOTOR STARTER HOUSING



DIE CAST ALUMINUM OUTBOARD MOTOR STARTER PULLEY

Literally, 101 applications are found for the use of aluminum die castings — ranging from the starter on top, down to the propeller — on today's dependable lightweight outboard motors. Unquestionably the use of aluminum die castings has played a major role in making practical the increasing use and enjoyment of outboard motors by millions of Americans. Their advantages are many: great savings in weight, corrosion resistance and minimum of machining required for finishing.

Note in the photograph above, the inclusion of mounting bosses in the castings which reduces assembling costs. The starter pulley, by LITEMETAL, shown above, includes the addition of brass inserts to afford greater wear resistance. Why not consult our designers . . . whatever your field of manufacture.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

Write today for literature and design information. Quick action on inquiries.

LITEMETAL DICAST, Inc.
A DIVISION OF HAYES INDUSTRIES
1925 WILDWOOD AVE · JACKSON, MICHIGAN
PLANT AND EXECUTIVE OFFICES

For more information circle No. 59 on the Reader Service Card

Belt Drive Selection: 177
Raybestos-Manhatten, Inc., Manhatten Rubber Div., 112-page engineering data book. Data book No. 10 contains many useful charts, tables and diagrams, plus complete specifications, for the selection and design of Poly-V belt drives. Standard drive tables simplify the selection of proper belts and sheaves for drives of any speed or horsepower rating. The book provides complete coverage of both theory and practical applications, with numerous illustrated case histories.

Vacuum Cleaning Systems: 178
U. S. Hoffman Machinery Corp., 8-page brochure. Stationary vacuum cleaning systems for the removal of all sorts of dust are described in Brochure AA-100. Included is a breakdown of the savings and advantages of the systems, plus a description of the engineering services available.

Plating Supplies: 179
The Udylite Corp., 12-page price guide. Attached to the company's latest bi-monthly price guide are two test tablets of "Zero-Mist H. T.," a surface agent for chromium plating solutions which completely suppresses mist and spray. Full instructions are given for testing the product.

Barrel Finishing Chips: 180
Macklin Co., 4-page bulletin. The company's new line of "Tumbrade-40" abrasive chips and triangular media, developed for mass production barrel finishing of ferrous and non-ferrous castings, is described and illustrated. Abrasive characteristics, complete specifications, and production advantages are included. Illustrations of typical barrel finishing machines are also given.

Poor Paint Adhesion?

Free Manual

SHOWS HOW PHOSPHATING WILL SOLVE YOUR PROBLEMS

If poor paint adhesion is your problem, chances are you'll find the solution in the Turcoat Phosphating Manual. This booklet describes the complete Turcoat line, tells the full story of phosphating and includes a valuable "Phosphating Reference Chart," which gives the answer to any paint adhesion problem.

TURCO PRODUCTS, INC.
Chemical Processing Compounds
6135 So. Central Ave., Los Angeles 1, Calif.
Factories: Newark, Chicago, Houston, Los Angeles
Offices in all Principal Cities
Manufactured in Canada by B. W. Deane & Co., Montreal

For more information circle No. 98 on the Reader Service Card

High Speed Cutting: 181

Detroit Reamer & Tool Co., 6-page folder. The company's line of drills, reamers, and counterbores is described and illustrated. Diagrams show the exact work done by each piece, and their advantages for different applications are discussed.

Dye Penetrant Inspections: 182

Turco Products, Inc., 4-page technical folder. Every aspect of dye penetrant flaw location — pre-cleaning, applying penetrant, removing excess penetrate, applying developer, and interpreting result — is discussed in this semi-technical report, designed as a manual of established and proved rules for performing inspections by the penetrant process. Illustrations show the process in use during production and fabrication, during periodic maintenance, and in the field.

Zinc, Aluminum Metalizing: 183

Red Spot Paint & Varnish Co., Inc., single-page bulletin plus file cover. File No. 2 describes three clear metalizing treatments for steel, zinc, and aluminum. Complete information for application is included. The file cover illustrates the company's research and development facilities.

Marking Equipment: 184

The Acromark Co., 8-page reprint. The wide use of marking equipment manufactured by the company is described and illustrated. Included is a history of the use of markings, and a history of the company and its growth.

Tool Holders & Inserts: 185

Allegheny Ludlum Steel Corp., 12-page catalog. Detailed information on the company's line of tool holders and throw-away inserts is given. The catalog is illustrated with tables, photographs, and drawings.

Continued on page 85

THE **Di-Profiler**

Flexible Shaft **RECIPROCATING TOOL**

Fast, accurate, versatile

For grinding, filing, scraping, honing, lapping, polishing — the Di-Profiler saves hours of tedious hand labor — especially on intricate, detailed, hard-to-get-at jobs.

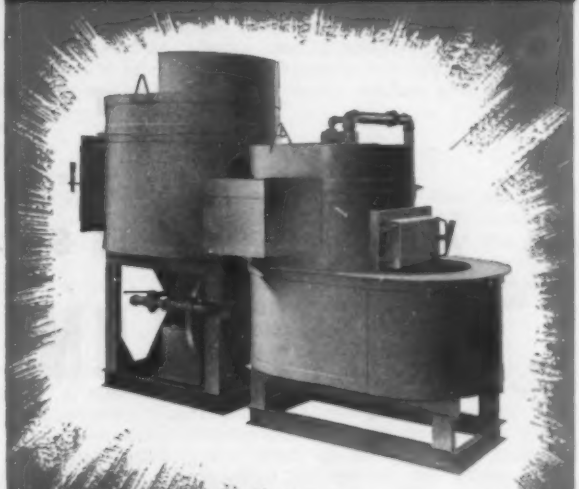
Driven by flexible shaft, the machine is light, sturdy, free from vibration. The speed of reciprocation is controlled by foot rheostat and can be varied from 0 to 100 strokes per second; the length of stroke is adjustable from 0 to ¼-inch.

Write for Free Demonstration or Illustrated Price List DV-57

ENGIS EQUIPMENT COMPANY
431 S. Dearborn St., Chicago 5, Ill.

For more information circle No. 108 on the Reader Service Card

HERE'S ANOTHER NEW ONE!



Stroman "DC" Cylinder Type Furnaces for Combination Melting and Holding Aluminum with CONTAINED COMBUSTION BURNERS

For Die Casting, Permanent Mold and Sand Casting Operations

"Versatility Plus" is the keynote of these newest Stroman Contained Combustion Furnaces. They are absolutely new in design for they incorporate Contained Combustion Burners which eliminate direct flame impingement on the metal. They also make for cooler working conditions because of less heat loss. They give greater fuel economy for less BTU input is required . . . Longest refractory life and least maintenance due to mild combustion conditions . . . Uniform heating condition and improved metal temperature control assure lowest metal losses.

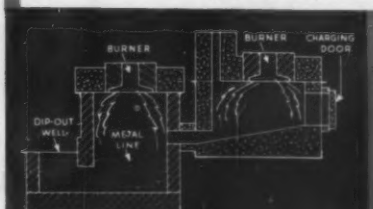
They are easy to charge and readily adaptable to automatic charging. Handling from 450 to 1600 lbs. per hour break down capacity with holding capacity from 600 to 2400 lbs., they will melt metal faster and more economically, and at the same time produce only the highest quality metal.

Roof of the furnaces are easily removed for furnace cleaning, relining, repair or burner service, as burner is mounted in the roof.

These Stroman "DC" Cylinder type furnaces are available in break down and holding combinations. However separate break down and holding units can be purchased. Break down units are often used to augment iron pot, electric and crucible furnace capacities.

Their flawless operation and ability to deliver years of trouble-free operation stamp them as a leading Stroman Aluminum production furnace. Investigate their cost cutting operation today.

Send for complete new catalogue No. 150 just off the press.



STROMAN
FURNACE & ENGINEERING CO.
FRANKLIN PARK
ILLINOIS

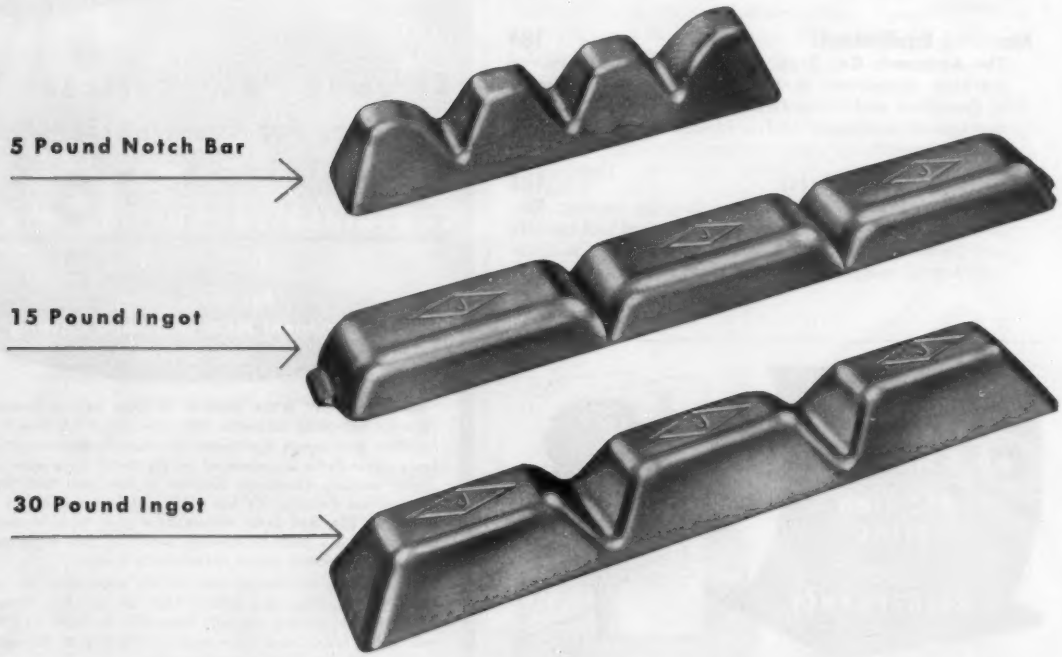
For more information circle No. 104 on the Reader Service Card

DIAMOND J QUALITY

AT NO PREMIUM

IN ALL GRADES OF DIE CAST

ALUMINUM ALLOYS



You pay no premium for superior quality when you use Jobbins' Diamond-J Aluminum Die Cast Alloys. All standard and tailored alloys are available in these standard ingots. Contact Jobbins on your requirements for dependable, high quality die-cast alloys.

WILLIAM F. JOBBINS INCORPORATED

P. O. BOX 230

AURORA, ILLINOIS

For more information circle No. 54 on the Reader Service Card

Bench Grinder: 186

Carborundum Co., Curtis Machine Div., single-page bulletin. Form No. A-1386 describes the Model DBA-O abrasive belt bench grinder, a light-weight, compact tool for all types of grinding, polishing, and deburring. Important features are described, and specifications are given.

Cutting Tools: 187

M. A. Ford Mfg. Co., Inc., 12-page catalog plus price list. The company's line of carbide cutting and grinding tools is described and illustrated in catalog No. 601. The recently-revised catalog devotes more space to solid carbide end mills, including two full pages of end mill data on 11 different types of mills.

Flexible Abrasive Discs: 188

Foster Supplies Co., 4-page bulletin. Flexible abrasive discs, made with a replaceable disc mounted on a rubber base, are described and illustrated. Applications for finishing inside and outside contours, flat or curved surfaces are illustrated.

Steel Products Catalog:

Crucible Steel Co. of America, 232-page catalog. More than 700 products, including 16 catagories of special purpose steels in 16,000 grades and sizes, are listed in a new "Product and Warehouse Catalog." Over 20 estimating, conversion, and weight tables as well as other information useful to steel users included. Requests for this catalog should be addressed on company letterhead to Engineering Service Dept., Crucible Steel Co. of America, Box 1558, Pittsburgh 30, Pa.

Silicone Applications: 190

General Electric Co., 8-page condensed catalog and data book. More than 115 different applications for silicones available from the company are discussed. Included are silicone uses as adhesives, heat transfer fluids, lubricants, release agents, and hydraulic fluids. Specialized literature covering product and application is also listed.

Stainless Steel Data Sheet: 191

Allegheny Ludlum Steel Corp., 4-page data sheet. A recently-published Blue Data Sheet gives detailed information on the company's stainless steel type 201, a chromium, nickel manganese stainless steel. Data includes analysis range, corrosion and oxidation resistance, and physical and mechanical properties.

Diamond Dressing Tools: 192

Craine-Schwartz Diamond Tool Co., A new folder contains illustrations and complete descriptions of some of the company's line of diamond dressing tools. Information is also given on the design of tools to customer specifications for special applications.

Drum Agitator: 193

Prenco Products, Inc., 2-page data sheet. Technical features of a new drum agitator available from the company are described. Included is a description of the procedure for mounting in the threaded bung of a standard 55-gallon drum, and a thorough discussion of why drum agitation is necessary. A ready-reference chart shows recommended agitation time for a full range of specific gravities encountered in liquid chemical mixing.

Pangborn Hydro-Finish cut cleaning time 50% in this plant

Paid for itself in only six months

Pangborn Hydro-Finish really paid off for this leading glass manufacturer. Cleaning quality increased moldlife 10% to 15% and total cleaning and polishing time was cut in half! The resultant savings paid for the machine in six months and represented a substantial weekly sum thereafter.

Today, through new design and use of air jet sluriators, Pangborn Hydro-Finish costs less originally, costs less to maintain and gives you easier handling and added efficiency. Write for Bulletin 1403 to PANGBORN CORP., 3500 Pangborn Blvd., Hagerstown, Md.

USE PANGBORN HYDRO-FINISH FOR:

Deburring • Surface finishing • Finishing threaded sections • Improving cutting tool life • Maintaining dies and molds • Removing grinding lines • Removing heat treat scale • Preparing surfaces

Pangborn

BLAST CLEANS CHEAPER

For more information circle No. 96 on the Reader Service Card

DATA IN ADS

continued from page 64

55. Investment Casting Furnaces—Full information is available from Detroit Electric Furnace Div., Kuhlman Electric Co. on two new direct-casting electric furnaces for investment casting.

56. Steel Castings—Literature from Lebanon Steel Foundry describes their "Ceramicast" process for casting steel.

57. Die Casting Machines—Bulletin 101 from Lester-Phoenix, Inc. gives specifications and complete descriptions of their line of die casting machines.

59. Aluminum, Magnesium—die castings, their production and advantages, are discussed in literature and design information available from Litemetal Dicast, Inc.

68. Brass Powder Parts—Detailed information on the design properties, production, and application of brass and other non-ferrous power parts is available from The New Jersey Zinc Co. Included are 20 case histories of brass and nickel silver structural parts.

69. Plaster Mold Castings—A new brochure from Ohio Precision Castings, Inc. contains interesting information on economical production of small parts.

73. Plunger Rings—Complete information is offered by Precision Piston Rings, Inc. on their unbreakable stainless steel die casting plunger rings.

75. Iron Powders—Information from Republic Steel Corp. describes their three grades of iron powders. The powders' "CDF" feature is explained.

76. Die Cost Savings—Data sheets available from Richards Tool & Mold Co. describes savings of up to 70 percent on zinc and aluminum die casting with the use of standard "Master Mold" cavity blocks.

77. Investment Castings—Facilities for increased dividends on investment castings are described in information from Scott Castings Div. of Rolle Mfg. Co.

79. Stainless Steel Ladles—and skimmers for non-ferrous metals are listed in data from Spincraft, Inc. Sizes in stock and prices are included.

80. "Powder Metallurgy Today"—is the title of a publication offered by F. J. Stokes Corp. Also available is Catalog 815, describing their complete line of powder metal presses.

84. Pilot Plant Facilities—A new booklet issued by Westinghouse Electric Corp., entitled "For a Competitive Edge," describes their new metals plant at Blairsville, Pa. and explains pilot plant facilities for exploring production conditions and creating prototype quantities for wrought alloys and molded-metal products.

85. Controllers, Indicators—Data is available from West Instrument Corp. on their complete line of temperature controllers, pyrometers, resistance indicators, potentiometers, and other precision instruments.

86. Finishing Non-Ferrous Metals—Detailed laboratory and engineering reports on the finishing of non-ferrous metals by the "Iridite" process are available from Allied Research Products, Inc.

88. Lower Machining Costs—Bulletins RT-1022 and RT-1326 from The Bellows Co. describes their full line of rotary work feed tables and index tables for speedier handling of parts during machining operations.

Continued on page 87

"large enough to handle big die casting jobs . . . small enough to give every job close personal attention"

. . . that's why you should buy

die castings from Pressure

You'll like doing business with Pressure—the efficient service, the better quality, the assurance of getting your job done right. This is why so many of our customers keep re-ordering "die castings from Pressure."

PRESSURE CASTINGS, INC.

ZINC AND ALUMINUM DIE CASTINGS

21500 St. Clair Avenue • Cleveland 19, Ohio

For more information circle No. 74 on the Reader Service Card

90. Small Hole Drilling, Tapping—A catalog from Ettco Tool & Machine Co., Inc. describes their complete line of equipment for small hole drilling and tapping operations on a low-cost production basis.

93. Automatic Work Feeders—A new "Air Power" catalog offered by Mead Specialties Co. describes the company's complete line of automatic work handling devices.

94. Machine Deburring—of inaccessible holes can be done with Nobur tools. A complete catalog of these special tools is available from Nobur Mfg. Co.

95. Strip Paint Problems—If tough finished resist present stripping methods, Oakite Products, Inc. offers helpful information in two booklets: "How to Strip Paint," and "Here's the Best Shortcut in the Field of Organic Finishing."

96. New Design—Bulletin 1403 from Pangborn Corp. describes the design improvements, the company's "Hydro-Finish" equipment.

98. Paint Adhesion Problems—An informative reference manual from Turco Products, Inc. tells the full story of phosphating and includes a valuable "Phosphating Reference Chart" which gives the answer to any paint adhesion problem.

100. Ferrous, Non-Ferrous Investments—Information, specifications and prices are available from Centrifugal Casting Supply Co. on six "Whip-Mix" investments for ferrous and nonferrous casting.

104. Melting Furnace—Catalog 150 has been issued by Stroman Furnace & Engineering Co. describing their "DC" cylinder type furnaces for combination melting and holding aluminum. The furnaces are equipped with contained combustion chambers.

106. High Production Decorating—A catalog offered by Finish Engineering Co., Inc. describes their line of painting machines, spray masks, multifit mask clamps, and mask washers.

108. Fast, Accurate Grinding.—filing, scraping, and honing are a few of the jobs done by the "Di-Profilier," a flexible shaft reciprocating tool described in an illustrated price list from Engis Equipment Co.

continued on page 88

8 reasons

why you should switch to

UCON

brand hydrolubes

Carbide's Safety hydraulic fluids

1) The *fire-resistance* of water-base UCON Hydrolubes has been proved by years of severe, exhaustive laboratory tests. In actual service, UCON hydrolubes have prevented serious fires and injuries during more than eight years of routine use.

2) UCON Hydrolubes have *no harmful effects* on packings and seals. Leakage losses are often lower than with other hydraulic fluids.

3) UCON Hydrolubes can be *safely handled* by workmen.

4) UCON Hydrolubes are made in *three standard viscosity grades*—200, 300, and 550 S.U.S. at 100°F. Other grades can be supplied to fit specific needs.

5) UCON Hydrolubes have *high viscosity indexes*—150 to 160.

6) UCON Hydrolubes are *good lubricants*. Special anti-wear agents provide satisfactory pump life and performance characteristics.

7) UCON Hydrolubes contain effective liquid and vapor phase *corrosion inhibitors* for the common metals.

8) UCON Hydrolubes have *low pour points*—a must for use at low temperatures.

UCON Hydrolubes are the answer to the problem of improved safety with hydraulic fluids. Get all the facts. Write *today* for the booklet "UCON Hydrolubes Spell Safety," Form 40134.

CARBIDE AND CARBON CHEMICALS

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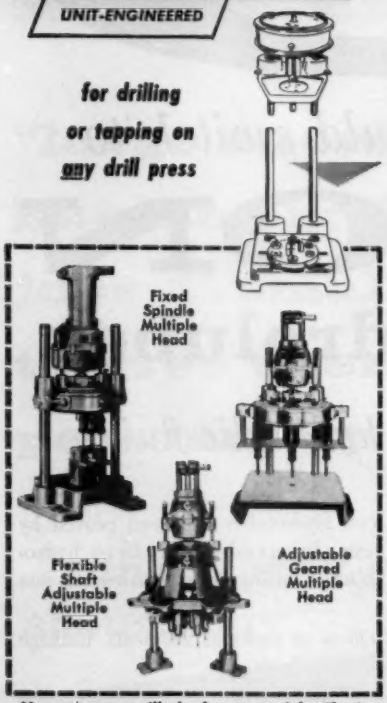
LET'S PUT OUR MULTIPLE HEADS TOGETHER!

...and plan your small hole drilling and tapping operation on a low cost, maximum production basis

ETTCO-EMRICK
MULTIPLE SPINDLE HEADS
UNIT-ENGINEERED

for drilling or tapping on any drill press



No one type will do for every job. That's why we make 'em all — and the correct custom tooling for faster handling of the parts. The Ettco system is a completely integrated service; not just multiple heads with spindles reaching into the air.

Ettco engineers can tell you without obligation which type best suits your specific job. They're all easily attachable to any drill press, tapping machine or automated special. Standardized, reuseable components mean lowered costs. Interchangeable face plates permit quick switch from tapping to drilling. Send us a sample part or drawing for recommendations — now, and ask for our catalog. *Distributors throughout U. S. and Canada.*

The only complete line manufacturer of drilling & tapping equipment for the entire small hole field

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586 Johnson Avenue, Brooklyn 37, N. Y.
TAPPING ATTACHMENTS • MULTIPLE HEADS • DRILLING & TAPPING UNITS AND MACHINES • SPECIAL MACHINES INDEXING FIXTURES • TAP & DRILL CHUCKS

Circle No. 90 on the Reader Service Card

111. Filtration Guide — Better, faster, cost-cutting filtration is described in a booklet issued by Sel-Rex Corp., Filter Div. It is entitled "Guide to Better Filtration."

112. Brighteners, Chromate Finishes — Bulletin 70.2 from Wagner Bros., Inc. gives full technical information on "Iso-Brite" copper, the Wagner cadmium and zinc brighteners, and chromate finishes.

114. Powdered Metal Parts — in a range of metals are illustrated in a folder from Reese Metal Products Corp., showing their powder metal facilities.

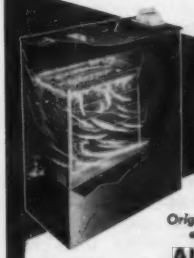
115. Investment Casting Manual — Important advantages of investment casting are described in a manual offered by Jelrus Precision Casting Corp.

ZINC INDUSTRY HOLDS MEETING

Members of the zinc industry gathered at Hotel Drake, Chicago, for the 39th annual meeting of the American Zinc Institute on April 25, 1957.

Circle No. 89 on the Reader Service Card

GET AHEAD
Stay Ahead in Your SPRAY DECORATING with CONFORMING MATRIX



Originators of efficient explosion-proof
AUTOMATIC MASK WASHERS

• The fastest made • Increase production with fewer tools • Eliminate damage and costly repairs of masks • Lowest solvent consumption • High pressure, no-leak pump • Send prints or sample parts, giving production requirements and results you wish to achieve.

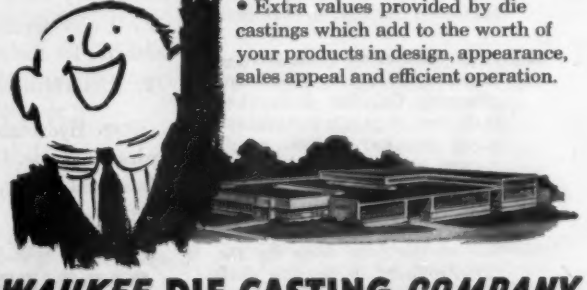
C-M

Conforming Matrix
CORPORATION
346 Toledo Factories Building
Toledo 3, Ohio

You Get EXTRA VALUES

— when you Specify DIE CASTINGS by MILWAUKEE

- Extra values provided by the modern Milwaukee plant with every facility for Complete Die Casting Service.
- Extra values provided by more than 45 years of continuous service to industry in producing precision die cast parts for all types of assemblies from small intricate instruments to heavy-duty equipment.
- Extra values provided by die castings which add to the worth of your products in design, appearance, sales appeal and efficient operation.



Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.

MILWAUKEE DIE CASTING COMPANY
4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN
Established 1909

For more information circle No. 61 on the Reader Service Card

$5400 annual saving

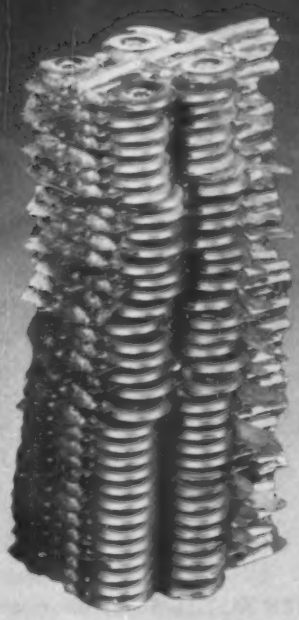
by $4200 investment in ECLIPSE FURNACE

New Double-Chamber Dry-Hearth-Type Metal Melter Proves Flexibility in Small Shop

Increases Production . . . Eliminates Rejects

● The new Eclipse double-chamber dry-hearth-type metal melter—actually a new method—replaced two crucibles and one reverberatory furnace at Le Claire Manufacturing Co., Le Claire, Iowa, and has paid for itself at the rate of $450 a month in savings! The new melter combines advantages of Eclipse direct firing with the first truly separate melting and holding chambers. At Le Claire, the one dry-hearth melter has made this remarkable record supplying all metal for the plant's sand- and die-cast aluminum casting operations. Castings for power mowers, electric and gas motors, as well as many others, are cast from this one furnace. Actually designed for high-production operation, the melter gives even better results in larger foundries.

Pigs are melted on a steep sloping hearth which gives fast run-off of molten metal to the holding chamber. Gassing and agitation of the metal in holding chamber are eliminated because no cold metal enters the bath. Direct firing permits faster, more efficient heating, requires less fuel. All moisture is driven off while metal is melting . . . all oxide inclusions are deposited on surface of hearth where they are easily removed by raking. Hearth and holding chamber are separately heated and controlled for ideal melting and pouring temperatures. And there are more additional quality-improving and cost-saving advantages for your *large or small* operation than can even be suggested here! Write *today* for . . .



Bulletin C-80 →

Eclipse®

ECLIPSE FUEL ENGINEERING CO.

1123 BUCHANAN STREET, ROCKFORD, ILLINOIS

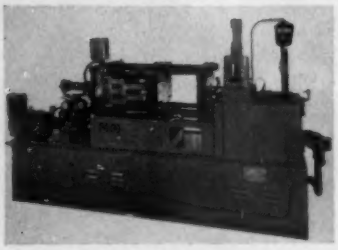
ECLIPSE FUEL ENGINEERING CO. OF CANADA, LTD., 28 UPJOHN ROAD, DON MILLS, ONTARIO

For more information circle No. 35 on the Reader Service Card

NEW PRODUCTS AND DEVELOPMENTS

Want complete details on these announcements? Use the Reader Service Cards. You'll find them facing page 64 of this issue

DIE CASTING MACHINE WILL HANDLE SHOTS UP TO 4 POUNDS



A high-speed die casting machine, built to handle shot capacities of up to four pounds, has been designed with many features of larger and costlier models.

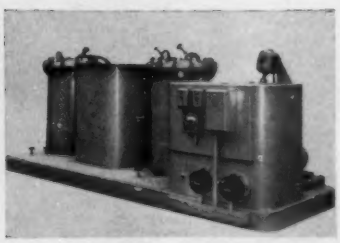
Outstanding features include all-steel welded construction, solid block steel toggles, 150-ton locking pressure, automatic electric cycling at high speed, blast-type furnace blower, moving platens supported by bronze carrier shoes, and controls and valves mounted for easy maintenance.

Designed to operate at speeds up to 500 shots per hour, the machine has 20 x 20-inch platens and an eight-inch die stroke. It is available in hydraulically operated plunger goose neck type for zinc, tin, and lead, or in cold chamber type for aluminum, brass, and magnesium.

Either standard or fire-resistant fluids can be used in the hydraulic unit.

American Die Casting Machinery Co.
For more information, circle No. 206 on the Reader Service Card

CASTING IMPREGNATOR REDESIGNED FOR IMPROVED AGITATION



A low-pressure, vacuum, casting impregnator has been redesigned to eliminate sharp corners inside the tanks, allowing sealants to agitate without loss of solids into square corners. Exterior corners of the tanks and platform have also been rounded for safety and neat appearance.

Requiring only two water connections and one drain connection, the impregnator uses a vented overflow system, which automatically insures replacement of rinse water.

The low-pressure unit employs a virtually noiseless water-cooled vacuum pump capable of producing 29 inches of mercury in four minutes. It is mounted for easy accessibility and maintenance.

The impregnator covers an area of 12 x 4 feet, and uses only one power inlet. Operating on AC or DC 115, 230, 450, or 560 volts, the wiring system is easily accessible by a trough on the platform.

Imprex Div., Ideal Industries, Inc.
For more information, circle No. 207 on the Reader Service Card

MOLTEN METAL PUMP in two models

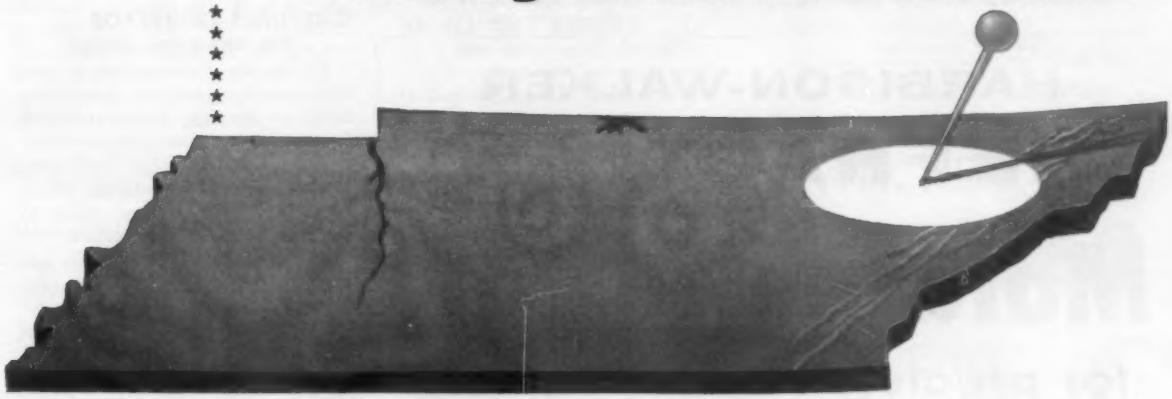
Two models of a molten metal pump for die casting metal have been designed with newly-improved alloys for parts in contact with molten zinc to nullify attack.

The model 104 pump tilts in and out of the metal off a caster carriage travelling on the ground alongside the melting pot. The model 105 tilts on a pivoted bracket attached to the side of the pot.

Variable-speed drive on both models provides for flow control from 3,000 to 20,000 pounds per hour, lifting metal 3 to 4½ feet into ladles, or into pipe or kettles for distribution into molds. The pump is powered by an electric motor.

Greenberg Engineering Co.
For more information, circle No. 208 on the Reader Service Card

We've discovered
PART OF AMERICA'S FUTURE
underground in Tennessee



As the American economy has expanded, the use of zinc by industry has greatly accelerated, until today's per capita consumption of zinc shows a giant 24% increase over the per capita consumption only seven years ago.

But what about the future? With zinc's importance to Industry's ever-increasing demands, what about the supply?

In recent months, American Zinc has discovered a part of America's industrial future... underground in Tennessee. In the East Tennessee area, mining properties which adjoin American Zinc's long-established Mascot, Tenn., mining operations, exploration and development have confirmed zinc ore reserves underground which are equivalent to *more than 75 years' production at the current rate* of mines now operating in this area.

Tomorrow's zinc for automobile grills and trim... the galvanized coatings for steel... zinc for die-castings and brass... zinc pigments for paints and rubber... now lies underground in American Zinc's Tennessee development.

American Zinc, lead & smelting company

Columbus, Ohio · Chicago · St. Louis · New York · Detroit · Pittsburgh

For more information circle No. 12 on the Reader Service Card

HIGH-PRESSURE IMPREGNATOR
. . . for mobile use

A new, all-on-one-platform, high pressure casting impregnator is now in production. The new unit is said to be compact, portable, and with minimum maintenance cost and installation time. In fact, installation has been reduced to setting the unit where it is to be used and providing one electrical connection.

The new impregnator is said to employ a more efficient, and less costly, high pressure system instead of the more usual pressure cycling system. A metallic sealant is used to close the pores in all types of castings.

The complete unit covers only 21 sq. ft. of floor space and can be built to operate with gas, steam or electricity as the heating medium.

Tincher Products Co.
For more information, circle No. 208 on the Reader Service Card

CASTINGS CONVEYOR
. . . has chainless design

Of simple construction, a new conveyor for castings, stampings, forgings, etc. has been produced. Instead of the conventional chain design, the conveyor has precisely-built flat side skirts which serve as links and as sides to contain conveyed materials.

Modular conveyor sections are built in standard 10-foot lengths for assembly to any length required. A highly flexible apron design permits conveyors with one drive unit to operate horizontally, with ascending or descending sections.

Hapman Conveyors, Inc.
For more information, circle No. 209 on the Reader Service Card

ZINC BRIGHTENING
. . . in one dip

A one-dip process with an easily-handled powder to produce clear bright surfaces on zinc plated work with no brighteners in the zinc bath has been developed.

The new powder, called Kenvert No. 16, is claimed to offer economies of up to 50 percent over previous methods.

It operates in the temperature range from 90 to 110 F with no ventilation required, and protects against corrosion, staining, and fingerprints.

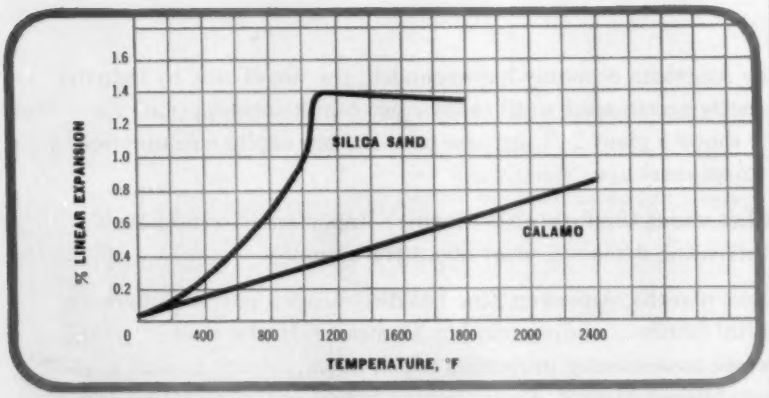
Conversion Chemical Corp.
For more information, circle No. 210 on the Reader Service Card

HIGH VACUUM PUMP
. . . delivers "clean" vacuum

A small version of the KMB two-stage, mechanical booster, high vacuum pump is now being offered. Like the larger version, the new model maintains uniformly high pumping speeds over a wide range of pressures and, since no liquid sealant is used in the first stage, delivers "clean" high vacuum.

The unit consists of a water-cooled, lobe type rotor pump, driven through a flexible coupling by a 2 hp., 3600 rpm. motor. The motor, in turn, is backed by an

HARBISON-WALKER
REFRACTORY
Mold Materials
for precision metal casting



CALAMO, one of the extensively used Harbison-Walker products for investment molding is an alumina-silica refractory of optimum sizings for various particular mixtures. Its fusion point is 100°F. higher than that of normal silica sand mixes.

The chart above shows the exceedingly desirable expansion curve of CALAMO as compared with that of silica sand. CALAMO used as the major constituent of investment mixes, improves the dimensional constancy of the molds and makes them stronger and more resistant to erosion.

With CALAMO, over-all investment costs are measurably reduced because an appreciably lesser amount of bonding agent is needed. This is attributable to the very desirable particle sizing and equiaxed, dense grains of CALAMO.

H-W MOLDSAND BOND is a highly refractory clay having unusual plasticity and bonding strength. Used alone or with other binders, it imparts enhanced hot strength to molds, and in some mixes replaces, wholly or in part, binders of higher cost. It is used with equally good results for rammed mixes with sand and Calamo. Molding mixes made with H-W MOLDSAND BOND have decidedly improved storage properties.

Write us for information regarding other Harbison-Walker products — mold wash materials — ceramic molding media — shell molding minerals.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Most Complete Refractories Service
GENERAL OFFICES PITTSBURGH 22, PENNSYLVANIA

For more information circle No. 49 on the Reader Service Card

air-cooled, compound pump coupled to a 1 hp., 640 rpm. gear motor.

A baffled, interstage connection is provided between the two pumps, and both pumps and motors are mounted on a common base. The unit continues to pump with positive displacement at pressures said to greatly exceed the stalling pressures of oil booster pumps or oil vapor ejectors. This feature makes the pump especially suitable for vacuum furnaces or other systems in which large gas bursts can occur.

Kinney Mfg. Div., The New York Air Brake Co.
For more information, circle No. 211 on the Reader Service Card

CLAMPCUT SWIVEL VISE . . . holds eccentric shapes

A new clampcut swivel vise has been developed that eliminates the need for milling fixtures for eccentric shapes. Besides holding "out of square pieces," "rounds," and "extra height" pieces, the vise can be used for milling .0005" parallel.

Features of the new vise are in and down jaw clamping action, trigger stop for split-second open-close, adjustable vee's for holding round work in vertical position to vise capacity, and self-cleaning snap-on parallels for fast load-unload.

J & S Tool Co., Inc.
For more information, circle No. 212 on the Reader Service Card

SPINDLE LOCATOR PLATE . . . converts adjustable heads

A new addition — the spindle locator plate — to the complete line of the company's Universal joint drilling and tapping heads has been announced.

The plate converts the fully adjustable Universal joint head to a controlled jig bored fixed center head. The plates are made of sand cast aluminum and can be adapted to ¼", ½", and 29/32" capacity heads.

The plates are also made to be interchangeable with the standard locator arms of the Universal joint heads.

Errington Mechanical Laboratory, Inc.
For more information, circle No. 213 on the Reader Service Card

NON-FLAMMABLE SOLVENT . . . for cleaning, degreasing

A neutral, non-toxic, nonflammable solvent that cleans, degreases, and rustproofs metal surfaces in one operation has been announced.

Called Immunol, the product can be applied by any method now in common use to clean anything from small parts to heavy machinery.

The new material is mixed with either hot or cold water and is reported to be superior to carbon tetachloride, trichlorethylene, kerosene or other commonly used cleaners and degreasers.

Harry Miller Corp.
For more information, circle No. 214 on the Reader Service Card

SMALL BELT SANDER . . . for shop and foundry

A new belt sander recently introduced uses 42" belts either 1" or ½" in width.

Drive is from a contact wheel mounted on a motor shaft over an idler pulley on the end of a spring loaded column. At a motor speed of 1750 rpm a belt speed of 1850 sfm is attained.

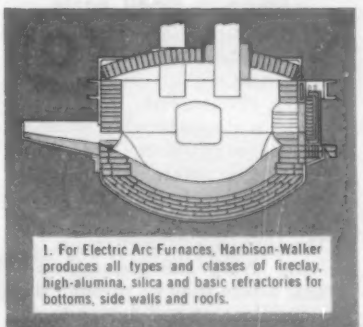
The column can be swung through 180 deg. to allow the operator to set the machine for the most comfortable and convenient operation.

The Brubaker Mfg. Co.
For more information, circle No. 215 on the Reader Service Card

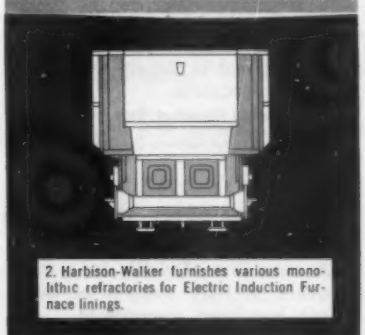
Continued on page 94

HARBISON-WALKER

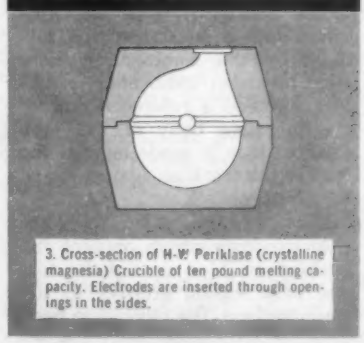
REFRACTORIES



1. For Electric Arc Furnaces, Harbison-Walker produces all types and classes of fireclay, high-alumina, silica and basic refractories for bottoms, side walls and roofs.



2. Harbison-Walker furnishes various monolithic refractories for Electric Induction Furnace linings.



3. Cross-section of H-W Periklase (crystalline magnesia) Crucible of ten pound melting capacity. Electrodes are inserted through openings in the sides.

meet every melting furnace requirement

AMONG the many kinds of refractories made by Harbison-Walker for all the different types of electric induction, arc and resistance furnaces and for the wide variety of metals, are some particularly adapted for highly specialized requirements.

H-W CORUNDUM is the 99+% Alumina preformed refractory used in linings of furnaces for melting pure aluminum, free from contaminants.

H-W PERIKLASE melting crucibles are the accepted standard for many precision metal molding operations.

We will be glad to provide complete data for these and other Harbison-Walker refractories, especially suited for melting furnaces.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Most Complete Refractories Service
GENERAL OFFICES PITTSBURGH 22, PENNSYLVANIA
For more information circle No. 50 on the Reader Service Card

FILTER PUMP
. . . is all plastic

An all plastic, self-priming filter pump with a special Dynel filter medium has been designed to remove particles down to one micron in size from acid or alkaline electroplating and industrial solutions.

Designated the VPHI-20, it is useful wherever all metal contact must be avoided, as the polyethylene body and Hypalon impeller are completely corrosion-resistant. No metal parts are wetted.

Coupled to a one-quarter HP totally-enclosed motor, the pump is self-lubricating and will not leak. The filter chamber, made of Bakelite rigid polyvinyl chloride with two Dynel filter tubes, can handle up to 300 gallons per hour.

Sethco Mfg. Co.
For more information, circle No. 222 on the Reader Service Card

EJECTOR BOX
. . . enlarges machine capacity

A new ejector box is now available for air operated DCMT die casting machines. It is interchangeable with ejector boxes on all existing machines.

The new design permits ejection over the complete area of the die block, to a maximum size of nine by nine inches. The unit thus enlarges the machine capacity on thin wall, wide area castings.

British Industries Corp., DCMT Div.
For more information, circle No. 223 on the Reader Service Card

AIR LUBRICATION SYSTEM
. . . gets more production

Lubricant savings, scrap reduction, increased mold life, and increased production are among the advantages claimed for a compressed-air die lubrication system.

Called the "Air-Lube" System, the unit both cleans and lubricates die surfaces with a fully-controlled air jet followed by a pressurized lubricant fog.

Speedy operation is made possible with an easily-handled "Siamese" type gun. One pressure directs a powerful air jet to clean the mold, and a further pressure on the same gun shuts off the air and shoots the vaporized lubricant.

Pierce-Weller Co.
For more information, circle No. 103 on the Reader Service Card

CENTERING MACHINE
. . . gives high output

A new machine designed to perform a centering operation at a high production rate has been announced.

The machine, which incorporates two opposed automatic drilling units, is said to be simple to operate. The operator loads the part into a fixture and depresses the start cycle switch—the work is automatically clamped, centered at both ends and unclamped, ready for removal. Production rate has been set at approximately 360 pieces per hour.

Govro-Nelson Co.
For more information, circle No. 225 on the Reader Service Card

FLEXIBLE ABRASIVE WHEEL
. . . now in smaller sizes

A new, smaller size, flexible, coated abrasive wheel for contour grinding and polishing has recently been made available.

The manufacturer of this wheel formerly made units in 6 in. to 17 in. diameters only with face widths from 1 to 3 inches. The new wheel is only 3 inches in diameter with a 2 inch face width.

Various grits of coated abrasive

Inducto "Push-Out" Furnaces save minutes on every melt

Inducto "Push-Out" furnaces with removable crucibles save valuable minutes in transfer time on every melt . . . meaning extra melts per day . . . thousands of extra castings each year. The moment the charge in one crucible is ready for pouring, the power is immediately transferred to the waiting charge in the other crucible. The crucible of molten metal is raised from the furnace hydraulically so it can easily be transported to the molds.

Inducto "Push-Out" furnaces are short and compact, occupying minimum floor space. The operator's controls are mounted on the furnaces for convenience and accessibility. When teamed with Inducto Precision Control, these furnaces offer the ultimate in production melting.

More detailed information may be obtained by writing for Bulletin 70. Write today.

INDUCTOTHERM CORP.

412 Illinois Ave. • Delanco, N. J.

For more information circle No. 51 on the Reader Service Card

HOLD DOWN THOSE DIE CASTING COSTS

Protect the "hot spots" in your equipment . . . End seizing and galling of die fittings

USE Thred-Gard High Temperature Anti-Seize Compound to protect equipment and fittings up to 1200°F. Eliminate production losses and maintenance costs due to heat strain, seizing and galling.

Here's what a drop or two of Thred-Gard will do:

Die casting machines—Reduce down time by insuring continuous, long lasting operation of plunger, plunger pivot, lever shoes and gooseneck adjustment.

Die casting dies—Insure efficient, uninterrupted operation of ejector pins. Prevent thread fracture on screws and hollow head bolts due to seizing and galling—yet, initially, permit them to be drawn to a greater degree of tightness. Save money on your die casting operations. Ask about Thred-Gard. Request a free sample.

Crane Packing Company, 6473 Oakton St., Morton Grove, Illinois. (Chicago Suburb). *In Canada: Crane Packing Co., Ltd., Hamilton, Ont.*

JOHN CRANE — CRANE PACKING COMPANY

For more information circle No. 27 on the Reader Service Card

can be used in the wheels from very coarse for deburring, smoothing flash and chamfering to very fine for polishing and buffing.

The new 3 inch diameter allows the wheel to be used for sharp bends, contours of small radii and confined areas such as the inside of tubing.

Merit Products, Inc.
For more information, circle No. 226 on the Reader Service Card

DRILLING MACHINE DRIVE . . . for long runs

A new type drive for the Edlund Model 2F drilling machine has been announced. The new drive is designed for companies having long production runs either at one or several preselected speeds.

Using the single speed drive (single step sheave), positive drilling and tapping is provided directly from the motor through twin A-section V-belts to the spindle.

With five speed drive (five step sheave), power is transmitted through positive B-section V-belt on a five step sheave. Belt tension adjustment for both type drives and belt speed changes for the five speed drive are made easily from the front of the machine.

Edlund Machinery Co.
For more information, circle No. 227 on the Reader Service Card

SILICATE-BASED BINDER . . . for molds and cores

A marked departure in chemical formulation from conventional approaches to silicate-based binders is represented by a new silicate-based sand binder for mold and core production.

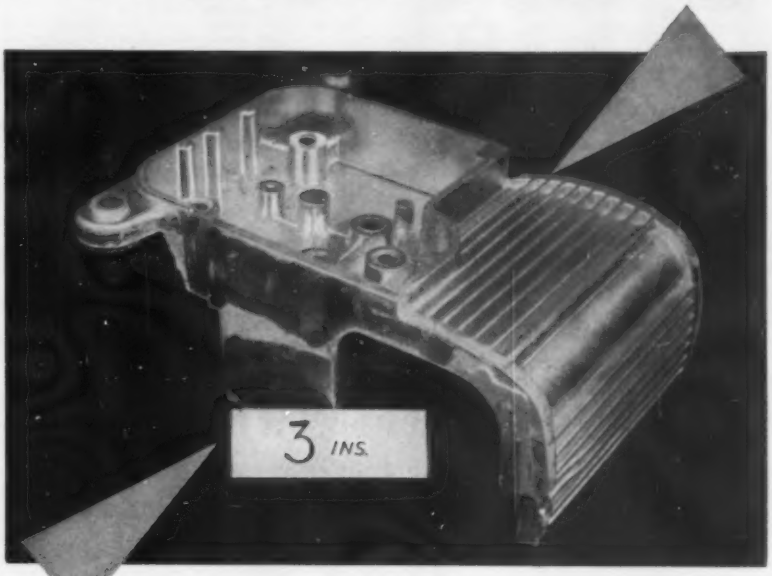
Advantages claimed for the binder include no separation in storage, low viscosity, good bench life, superior gas reaction, good storage life, and good collapsibility. Use of the binder in mold and core production is said to increase productivity of floor space and keep gas evolution low.

With drying and baking operations eliminated, molds and cores of better dimensional accuracy are said to be produced as well as castings of superior finish.

Diamond Alkali Co.
For more information, circle No. 228 on the Reader Service Card

Continued on next page

You can SEE the difference . . .
with **FOSECO DYCOTES**



an example of the excellent surface finish you can have with FOSECO Dycotes

FOSECO Dycotes provide an extensive range of coatings for both permanent mold and die casting work. Special grades are available for billet and slab production, centrifugal and chill molds.

Why you should use FOSECO Dycotes . . .

FOSECO Dycotes

- *. . . greatly improve surface finish*
- *. . . increase production*
- *. . . improve die life and reduce maintenance costs*
- *. . . help to control casting solidification*
- *. . . produce medium to highly finished surfaces*
- *. . . come in grades for all metals*
- *. . . save you time and money*

We don't have space to give you all the facts on FOSECO Dycotes here. So, we've prepared a leaflet giving all the facts on how FOSECO Dycotes can help solve your permanent mold and die casting coating problems. Just send this coupon and you will receive, free of charge, your copy of the FOSECO Dycotes leaflet.

FOUNDRY SERVICES, INC.
2000 BRUCK STREET — COLUMBUS 7, OHIO
In Canada: FOUNDRY SERVICES (CANADA) LTD., 201-7 Alice St., Guelph, Ontario

Send this coupon for your free leaflet giving all the facts about FOSECO Dycotes.

Name_____
Company_____
Address_____
City_____ State_____

For more information circle No. 39 on the Reader Service Card

Conveyor Belt Grinder . . . with four heads

Designed for high-volume flat surfacing of ferrous and non-ferrous metals, glass, plastics, ceramics, etc. a new four-head belt grinder produces fine micro-inch finishes to exacting tolerances.

The contact-wheel abrasive belt machine also makes possible a single-cycle operation from rough casting to polished part. The machine is particularly adaptable to automatic production lines; parts can be carried for presentation to the conveyor belt, automatically ejected, and carried to the next operation. Quick manual adjustment of the conveyor belt speed is obtained for settings of from 2 to 25 ft. per min.

Engelberg Huller Co.
For more information, circle No. 229 on the Reader Service Card

CHROMIUM PLATING CATALYST . . . improves quality

Described as the first commercially successful catalyst for chromium plating baths, a new additive is reported to speed up and simplify chromium plating operations and, at the same time, lower costs and improve the plate quality. It is applicable in both decorative and hard chromium plating baths.

The catalyst replaces a portion of the sulfate used in conventional chromium plating solutions and is a non-consumed component of the bath except for losses that may occur due to drag-out.

The principal benefits derived from the use of the new catalyst, according to the manufacturer, include faster plating, broader operating range of plating solution and greater covering power. It is also reported to make possible the electrodeposition of brighter and harder chromium coatings.

Diamond Alkali Co.
For more information, circle No. 230 on the Reader Service Card

LIGHTWEIGHT STEEL NUTS . . . are vibration-proof

The addition of a ⅜"-16 size Acorn type Palnut to the company's present line of similar nuts has been announced.

The new nut is a spring steel lock nut which exerts a vibration proof locking action when tightened. The nuts are said to be light in weight, low in cost, and available in plain steel as well as cadmium, chromium, nickel, brass, and dull black finishes.

The Palnut Co.
For more information, circle No. 231 on the Reader Service Card

STEEL CENTER BUFFS . . . have cooling effect

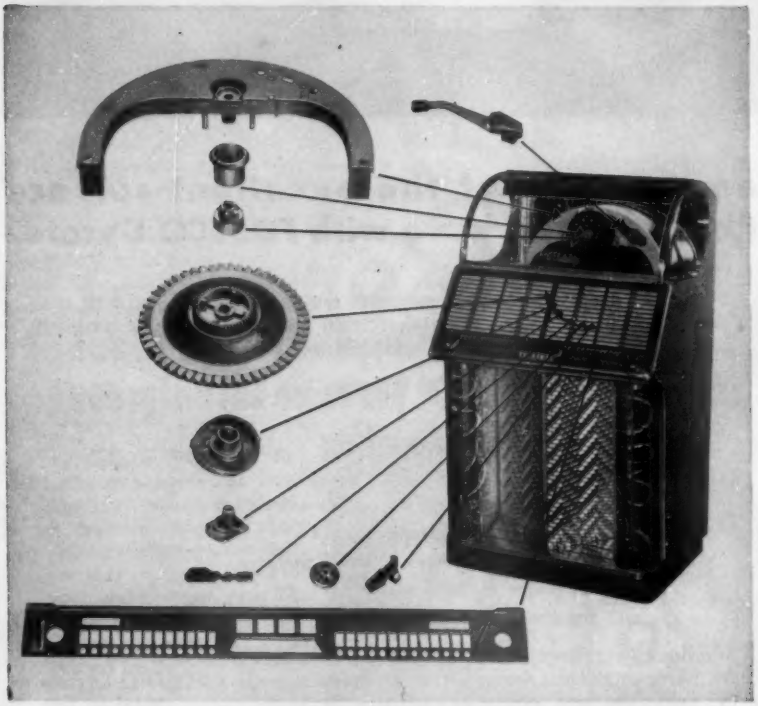
New steel centers on some types of buffs make the metal finishing wheels capable of dissipating frictional heat fast enough to keep the buff cool under all practical operating conditions.

The center is composed of two steel discs and provides stronger support for the buffs than the fiberboard centers formerly used. The central section of the buff is sewed together just past the steel area, providing an additional safety feature.

The discs used for centers have steel clamps that are set deep in the cloth. The discs are multiple spot-welded together. Six ventilating holes assure a free circulation of air from the center of the buff to its periphery.

Hanson-Van Winkle-Munning Co.
For more information, circle No. 232 on the Reader Service Card

ACCURATE Aluminum, Zinc and Magnesium Die Castings help WURLITZER



. . . produce an outstanding high fidelity phonograph at lower cost

■ To help maintain its reputation for high quality products that are competively priced, the Wurlitzer Co. specified ACCURATE die castings. They were sure that every die casting would meet every specification. Cast to close tolerances, these castings required little or no machining, are light in weight, and are ready to use as cast.

Whether it's aluminum, zinc or magnesium die castings, ACCURATE is completely set up to help you with your requirements.
Contact us today for prompt action.

Aluminum, Zinc and Magnesium Die Castings

ACCURATE DIE CASTING CO.
3085 E. 80th STREET • CLEVELAND 4, OHIO

For more information circle No. 3 on the Reader Service Card

PRECISION METAL MOLDING

invites you to attend the

1957 DESIGN ENGINEERING SHOW

New York Coliseum

May 20 to 23, 1957

The Original Equipment Market Exposition

Watch hundreds of product demonstrations. See the widest range of materials, components, parts, fasteners, finishes, in thousands of actual and potential product applications. Talk with the men who engineered these products. Get technical information and literature to help you solve design problems the year around. Find hundreds of ideas for doing a better job of designing new products and re-designing the old. 350 leading manufacturers will present their products to you on three floors of the new, giant New York Coliseum.

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For additional show tickets, and conference information write to:
Clapp & Poliak, Inc., 341 Madison Ave., N. Y. 17, N. Y.

LITHO IN U.S.A.

DIE LUBRICANT
. . . specifically for die casting

Two grades of die lubricants, "Di-Alube No. 10" and "Di-Alube No. 15," have been specifically formulated for use in die casting. No. 10 is used for aluminum and zinc, and No. 15 for aluminum, magnesium, and brass.

Sold in a semi-solid paste which is cut to spraying consistency by mixing with solvents, the lubricant is applied to the die with an air gun, the nozzle of which has a bit of cloth or rag attached.

It is claimed to produce stain-free castings without soldering, porosity, ejector pin sticking, or excessive smoking or odor.

Milwaukee Metalube Corp.
For more information, circle No. 233 on the Reader Service Card

SELF-TAPPING INSERTS
. . . in repair kit

The company's Tap-Lok inserts are now available in repair kit form to provide a practical method of repairing worn, damaged and stripped threads.

The inserts are self-tapping steel bushings, internally and externally threaded, which increase the thread-holding strength of aluminum, magnesium, brass, plastics, cast iron and other materials.

With the kit, it is stated that damaged threads can be repaired in two steps — drilling the hole and driving the insert.

Groov-Pin Corp.
For more information, circle No. 234 on the Reader Service Card

Self-Lock Spline Nut
. . . for light metals

Tighter grip and smoother installation in aluminum and magnesium alloys are among features listed for a new, self-locking spline type nut.

Designed to be used as self-wrenching fasteners for aircraft and industrial uses, the Type ND2398 nuts serve as blind mounting fasteners for spots where an attached nut is desirable.

Other important features are: accommodating "AN" thread length bolts used in aircraft construction; minimizing hoop stress and insuring proper seating; and use in close clearance applications.

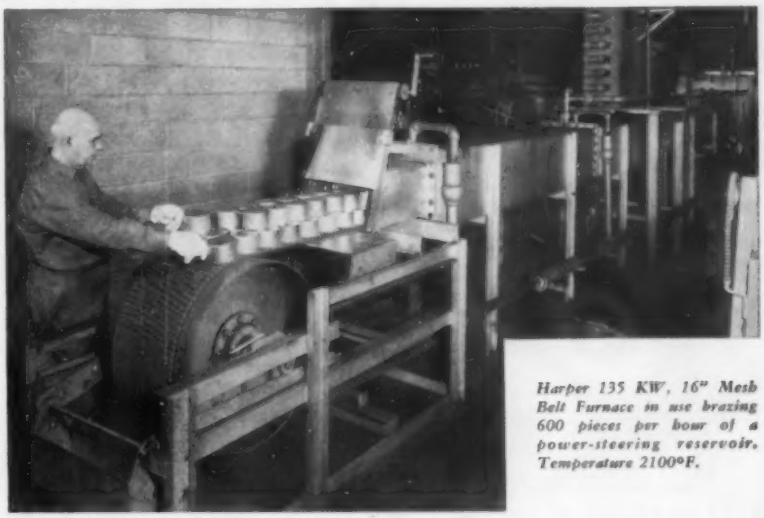
The Type ND2398 is available in 10-32, ¼-28, 5/16-24, ⅜-24, 7/16-20, and ½-20 thread sizes.

Elastic Stop Nut Corp. of America
For More information, circle No. 235 on the Reader Service Card

Continued on page 100

Want Higher Furnace Production? . . . .

MODERNIZE WITH HARPER HIGH TEMPERATURE MESH BELT FURNACES



Harper 135 KW, 16" Mesh Belt Furnace in use brazing 600 pieces per hour of a power-steering reservoir. Temperature 2100°F.

If you need up to 50% greater continuous furnace capacity without increasing space; and if your operating temperature range is 1800°-2100°F, a modern Harper Mesh Belt Furnace may well be the answer to your requirements.

These compact continuous furnaces are designed to utilize fully the advantages of silicon carbide heating elements* and today's high temperature oxidation-resisting alloy mesh belts.

Silicon carbide resistance heating elements allow high concentration of heat in a small space, thereby providing considerably greater production than furnaces of similar size using ordinary nickel alloy elements. Silicon carbide elements are also replaceable without complete furnace shutdown.

Two more important advantages of Harper Mesh Belt Furnaces are:

1. MULTIPLE-ZONE HEAT CONTROL — Heating elements are connected in several individually-powered and controlled zones for maximum flexibility of the heating curve.
2. PRODUCT UNIFORMITY — Furnace design based on many years of experience plus properly applied control instrumentation means uniform product day after day.

There are many more plus values. These economical furnaces are designed for operation with all types of standard atmospheres. An automatic non-loading belt take-up mechanism adjusts belt tension without reducing useful belt loading. A small water-cooling chamber next to the hot zone can be readily removed for maintenance or replacement due to rapid oxidation.

Harper Mesh Belt Furnaces are available with or without alloy muffles. Matching preheat furnaces are also obtainable. For full information write for Bulletin 454 to Harper Electric Furnace Corporation, 41 River Street, Buffalo 2, New York.

*Nickel alloy elements available for lower temperature applications.

HARPER
ELECTRIC FURNACES
For Continuous Brazing, Sintering, Wire Annealing, Bright Annealing, Annealing, Forging and Research

For more information circle No. 43 on the Reader Service Card

PB = ?
PB = HB

Problem: What would be the finest type of casting for our Perkins Brailler which would be lightweight, rugged and low in cost . . . and where can it best be done?
Solution: Versatile Aluminum Die Casting . . . by Hampden Brass & Aluminum Co.

When the Perkins Institute for the Blind was faced with the problem of the best possible casting method to use for their Braille writer, they called on Hampden's 50 years experience and know-how . . . and the answer was aluminum die casting.

For the first time, the world over, a completely portable Braille writer was produced . . . cast in eleven die castings! Remarkably lightweight (Braille writer weighs only 9 lbs.) yet it has an embossing pressure of 40 lbs! The intricacies possible in aluminum die casting permit the castings to be held together by screws and nuts, the nuts being located in cored pockets. The flexibility of this arrangement allows the castings to be easily handled, enamel-baked . . . and assembled without any drilling or fitting.

Remember . . . whether your casting problems are big, tiny, intricate, or special . . . Hampden is ready to effectively solve them with premium quality castings of aluminum or other non-ferrous metals . . . utilizing the sand, permanent mold or die casting method. Our more than 50 years' know-how is your assurance of the best casting techniques to help reduce costs and improve performance.

Why not contact Hampden Brass & Aluminum Co. on your next casting problem . . . and avail yourself of our engineering counsel?

Send for brochure, "Behind the Scenes" . . . complete digest of Hampden's experience, equipment and facilities.

HB

HAMPDEN BRASS AND ALUMINUM CO.
Established 1903
262 Liberty St.•Springfield, Mass.
Producers of Sand, Permanent Mold, Die & Fiberglas Castings

Circle No. 42 on the Reader Service Card

SAND COATING MULLER . . . applies shell resin

A sand coating foundry muller, specially designed for the preparation of shell molding sands, has been announced. The new machine is designed for rapid and thorough coating or blending of dry sand with either dry or liquid phenolic resins for use in shell molding and shell core blowing.

Coating with either dry or liquid resin is accomplished in from 12 to 15 minutes and before discharge the sand mixture is thoroughly dryed by compressed air supplied by an integrally mounted blower.

While designed specifically for mixing sand resin materials for shell molding the muller is equally effective for mixing oil sands or green sand facings.

Shellway Corp.
For more information, circle No. 236 on the Reader Service Card

VIBRATION-FREE DRILL . . . for small holes

Accuracy and sensitivity in drilling and tapping small holes in delicate work is said to be improved by new vibrationless units.

Drive motor frames on both drilling and tapping units rotate

SPRUEMASTER

- Increases Production
- Economical
- Lessens Fatigue
- Powerful Holding

Other Sprue Sizes and Shapes Available to Fit Present Handle!

The unbelievably lightweight SPRUEMASTER will increase production and lessen operator fatigue in all die casting shops. Made of high-strength aluminum alloy, the SPRUEMASTER provides complete safety and convenience.

Size	1-24 ea.	25-48 ea.
10-inch	$12.00	$11.50
15-inch	$15.00	$14.25

OSBORN MFG. CO.
WARSAW • INDIANA

Circle No. 70 on the Reader Service Card

NOW...
a Skimmer that really SKIMS! from Spincraft

Skimmers and Ladles available in STAINLESS STEEL and MILD STEEL

In answer to continued requests from hundreds of its ladle customers, Spincraft has added a line of truly superior skimmers. Designed after extensive research, Spincraft Skimmers meet die casters' skimming requirements. The shallow radius "skims" instead of "ladles" as deep-cupped skimmers do. Correct size perforations prevent clogging. Handle stub fits common pipe—attach a handle of exactly the type and length you want. Diameters: 6", 8", 10" and 12".

SPINCRAFT LADLES
for non-ferrous metal pouring

Light, tough, long-lasting — designed to reduce operator fatigue, minimize spillage and improve heat transfer. In 23 sizes, from ¼ lb. to 30 lbs.—with or without handles. A die-casting *must.*

Write for complete data and prices on ladles *and* skimmers TODAY.

Spincraft
SKILL WILL DO IT
INCORPORATED

4131 W. State St., Milwaukee, Wis.

Circle No. 79 on the Reader Service Card

with drive pulleys to produce a flywheel effect and consequently, increased stability. The pulley and motor operate as an integral unit and, with ball bearing construction employed, maintain uniform tension on drive belts, assure constant speed, eliminate vibration, and obtain a high degree of precision.

Power transmission to the spindles is applied by round weave endless belts with means of adjusting tension. The spindle on the drilling unit employs speeds from 3500 to 10,000 rpm and the tapper spindle has a speed of 1700 rpm for tapping and a return speed of 2100 rpm.

Heller, Inc.
For more information, circle No. 237 on the Reader Service Card

MOLD RELEASE LIQUID . . . aids die casting

A special combination of chemicals together with a new basic ingredient in a recently-developed mold release liquid reduce the number of release applications necessary in production of die cast or plastic products, the manufacturer claims.

When applied in liquid form, the new type, considered suitable for castings, dries quickly to produce a hard, smooth, glossy surface. As a result, the length of cycles between applications is increased and the number of rejects is reduced.

The liquid is also recommended for compression molding, laminating, reinforced plastics, and lay-up molding. Longer mold life is also claimed by the manufacturer.

Vin-Rock, Inc.
For more information, circle No. 238 on the Reader Service Card

SELF-LOCK SPLINE NUT . . . gives tighter grip

Designed for use with aluminum and magnesium, a new self-locking spline nut is designed as a blind mounting fastener for permanent installations. A chamfered pilot on the shank centers the nuts on insertion and assures equal broaching of the installation hole wall by the splines. A chip relief groove immediately behind the pilot allows actual broaching of the hole, minimizes hoop stress in the work and insures proper seating. Reduced flange diameter of the new spline design permits effective use in close clearance applications.

Elastic Stop Nut Corp. of America
For more information, circle No. 239 on the Reader Service Card

Continued on page 102

ALLOYS AND CASTINGS FOR A COMPETITIVE EDGE

FREE . . . send for your copy of the helpful new Westinghouse booklet, *For a Competitive Edge* (B-6570). It describes how you can keep up with metals advances in the face of increasing investment and rapidly expanding metals science.

The booklet takes you on a tour of the new Westinghouse metals plant at Blairsville, Pa. Pilot plant facilities here can help you explore full production conditions and create prototype quantities for wrought alloys and molded-metal products. Some production capacity can be made available for fast, dependable delivery of metal products.

Arrange to see the 16-mm, full-color, 22-minute Westinghouse film, *This New World of Metals*. Write Westinghouse Electric Corporation, Materials Manufacturing Department, Blairsville, Pennsylvania. J-05003

YOU CAN BE SURE...IF IT'S

Westinghouse

For more information circle No. 84 on the Reader Service Card

Cam Milling and Contour Machining *Eliminated!*

This EPCo

INVESTMENT CASTING Proves the Point

PART: Cam for Aircraft Instrument

MATERIAL: Stainless Steel, 440

PROBLEM: To reduce time and cost involved in setting up and performing 8 different types of machining operations.

SOLUTION: An EPCO Investment Casting Completely dispensed with

1. Cut-off
2. Turning O.D.
3. Center Hole Drilling
4. Form Turning
5. Form Milling
6. Contour Milling
7. Slot Milling
8. Cam Milling

Leaving only cam polishing, bottom grinding and hole reaming.

CONCLUSION: Intricate Machine Parts by redesigning to EPCO Investment Casting tolerances can be made to give *better* performance at far less cost.

Send us drawings, samples and specification of parts for detailed process analysis and cost quotation without cost or obligation.

ENGINEERED PRECISION CASTING CO.

FREEHOLD RD.
MATAWAN, N. J.

MEMBER INVESTMENT CASTING INSTITUTE

Circle No. 101 on the Reader Service Card

POSITIONING TABLE . . . reproduces hole patterns

A new type of positioning table for production drilling operations is claimed to reproduce any pattern of holes within its capacity. It is said to be simple in design, low in cost, fast acting, consistently accurate within .001, and easily changed from job to job.

Available in various sizes to meet a wide range of work requirements, the new table may be mounted on any drilling machine. The table consists essentially of a movable portion which rides freely over a predetermined area on ball thrust bearings, and a removable hole location plate which carries the particular hole pattern to be reproduced.

An air-actuated locking mechanism aligns the table with the machine spindle for each operation and a fixed base is fastened to the machine table.

Howe & Fant, Inc.
For more information, circle No. 240 on the Reader Service Card

PRECISION MICRO DRILL . . . for holes down to 0.001

A precision micro drill with features that speed up difficult micro hole drilling down to 0.001 has been announced. According to the manufacturer the unit can be used by unskilled labor.

A magnetic chuck makes the drill an efficient, easy-to-use machine. Collets used with the chuck take most commercially available micro drills with shank sizes of 0.030, 0.040 and 0.061. Two magnetic drivers are provided to fit into the chuck with a drill holding power of 0.001 to 0.006 and from 0.007 to 0.020. The drills are inserted into the collets and placed against the magnetic driver which holds the assembly in drilling position.

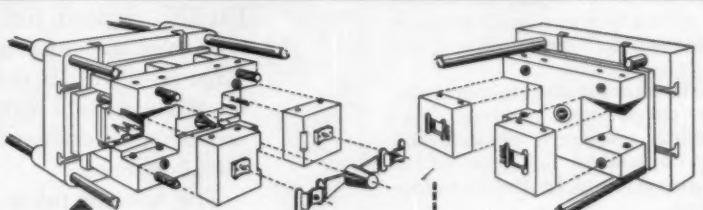
Runout is corrected instantly by truing with the finger or a pencil. This assures perfect concentricity, an important feature in small hole drilling.

The Dumore Co.
For more information, circle No. 241 on the Reader Service Card

HYDRAULIC POWDER PRESS . . . simplifies compacting

A hydraulically floated die table with an adjustable hydraulic resistance is one of the features of an new hydraulic press for powder metallurgy.

The press tools also permit compacting of parts having many projections in the pressing plane



Master Mold puts an end to expensive handling of large die blocks.

Small cavity blocks can be changed in minutes and save storage space.

MASTER MOLD SAVES UP TO 70%

on zinc and aluminum die casting

Master Mold can knock a big chunk off your die costs. It eliminates expensive die sets, leader pins, sprews, sprew cutters ***plus the expense of handling such heavy equipment.*** Master Mold cavity blocks need only minutes for changing. With them, you can run two jobs together — combining short and long runs, ***doubling your machine capacity.***

SEND TODAY FOR PROOF of Master Mold savings. Data sheets and complete cost-analysis facts, free on request, show you new die casting economy.

RICHARDS TOOL AND MOLD COMPANY

2715 LATHROP AVE. • RACINE, WISCONSIN

DESIGNERS AND BUILDERS OF FINE TOOLING

For more information circle No. 76 on the Reader Service Card

without additional built-in movements. All tool adjustments and most press adjustments are made between the press platens, which allow as much as 39 inches of working space.

The filler box is hydraulically operated and the shaking cycle can be regulated from 0 to 20 movements.

The press was developed by Bussmann-Simetag, West German powder metallurgy specialists.

Mannesmann-Meer Eng. & Constr. Co., Inc.
For more information, circle No. 242 on the Reader Service Card

NEW RELEASE AGENT . . . for die casting

An entirely new kind of release agent designed for use in the die casting of aluminum, zinc and alloys, has been developed.

Claimed to be completely odorless, smokeless, non-corrosive and non-toxic, the new Nalco material is also reported to show promise in forging operations, rubber and plastic molding.

The product is available in three viscosity-controlled grades, Nalco RA-1, RA-2, and RA-3. Viscosities in this series can be altered to suit special requirements or solve specific problems.

The RA series can be applied by either spray, automatic injection or brushing.

Samples for test purposes and additional technical data are available on request.

National Aluminate Corp.
For more information, circle No. 243 on the Reader Service Card

AUTOMATIC PAINT SPRAY . . . is fully adjustable

A new, automatic machine for the spray painting of cylindrical and rectangular parts, such as tubes, bottles, model trains, statuettes, toys, etc. has recently been developed.

Said to possess utmost flexibility, this machine has vertical traveling guns which can spray either on the downstroke, the upstroke or both. The work holder spindle can be held stationary or rotated.

The machine is air operated and has low-pressure hydraulic cylinders to drive the guns. The gun speed and travel are both fully adjustable in both directions. The spindle, when rotated, is adjustable from 50 to 400 rpm. A spindle stopping-locating device facilitates easy loading and unloading of work.

Conforming Matrix Corp.
For more information, circle No. 244 on the Reader Service Card

Type ID, 20-lb., 20-kw. Detroit Furnace with phantom investment mold attached.

Speed Investment Casting with Direct-Casting Detroit Electric Furnaces

Type IC, 10-lb., 10-kw. Detroit Furnace ready for casting.

With these two new Detroit Investment Casting Furnaces, precision parts of uniform high quality can be cast quickly, economically. Fast indirect arc melting maintains close metal analysis through heat after heat. When a melt is ready, the mold is clamped on and the furnace is inverted for pouring. Direct furnace-to-mold casting reduces handling and cuts the melting cycle to only minutes for parts up to 20 pounds.

Write today for full information on these two great investment casting furnaces: Type ID (20-lb. capacity) and Type IC (10-lb. capacity).

MEMBER FEMA

DETROIT ELECTRIC FURNACE DIVISION

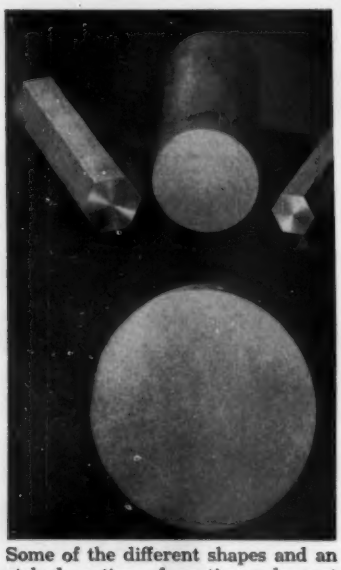
Kuhlman Electric Company • 1070 26th St., Bay City, Mich.

For more information circle No. 55 on the Reader Service Card

NEWS OF INDUSTRY & ASSOCIATIONS

activities of people, companies & groups in the precision metal molding industries

NEW PROCESS FOR CONTINUOUS CASTING OF NON-FERROUS METALS



Some of the different shapes and an etched section of continuously cast aluminum alloy.

Patents have been granted recently to Norman P. Goss on a radically new method for the continuous casting of non-ferrous metals, the Apex-Goss process.

A production operation has been carried out for over 2 years, in which aluminum and its alloys have been produced in a wide range of shapes. Other non-ferrous metals also are suitable for castings by this new method such as brass and copper and their alloys. The results of the work on aluminum have shown that (1) the finish is superior to that of the usual casting process and is stated to be "perfect" on certain alloys, (2) exceptionally high casting speeds can be obtained, (3) all types of aluminum alloys can be cast by this process, (4) any standard shape can be cast, including round, square, hexagonal, flat, etc., (5) grain size can be accurately controlled, (6) grain is consistently uniform, (7) small cross sections can be cast with ease, (8) lengths can be cut to most economical dimensions.

Aluminum-tin bearing alloys are successfully cast by the new Apex-Goss process. Ternalloy (aluminum - zinc - magnesium) produced by this method is free machining and requires no heat treatment. Deoxidizing rod continuously cast in this production machine gives better efficiency with closer control of residual aluminum in making fully killed steel than normally used shot, some steelmakers have indicated. Because of controlled, uniform grain size, extruders claim lower pressures can be used to extrude from the cast aluminum produced by the Apex-Goss process, and the uniformity of density is held responsible for the cleaner machining characteristics of the medium grain, free machining grade of aluminum shapes cast by this new process.

Most of these same advantages are expected to hold true for other non-ferrous metals.

The key to this new process is an oil lubricated graphite mold which was developed over a period of several years at Goss Laboratories in Cleveland, Ohio. This mold is extremely simple in design and operation and permits wide versatility in shapes produced by merely changing the mold.

The production development work on this new continuous casting process has been carried out by Apex Smelting Co. which has already licensed several large producers in the United States.

NEW LESTER SUB-PLANT

Part of the new Lester facility

Lester-Phoenix, Incorporated announced the formal opening of an auxiliary plant in Cleveland. The building was designed especially for the machining operations devoted to Lester Injection Molding Machines and Lester Die Casting Machines.

The new plant is a self-contained unit; the finished, inspected components are delivered to the nearby main plant where they are assembled into the Lester machines.

The new plant is an integral part of Lester's cost-control program aimed at offsetting the continually increasing labor and material costs.

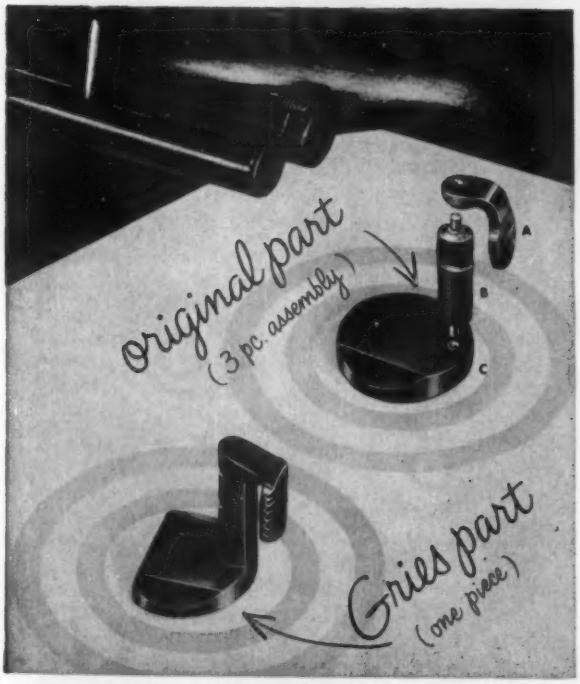
COBALT DEVELOPMENT INSTITUTE MEETS

The first General Assembly of the Cobalt Development Institute, created on January 16, was held in Brussels, Belgium, recently. The following officers were elected: Mr. Robiliart (Administrateur délégué of Union Minière du Haut-Katanga), Chairman of the Institute; Mr. E. C. Baring (Director of the Rhokana Corporation, Ltd.), Vice Chairman; and Mr. Ch. Piedboeuf (Chairman of the Centre d'Information du Cobalt), Vice Chairman.

The Cobalt Development Institute is a technical and scientific organization. Its object is to improve the uses of cobalt and to develop new ones. The Belgian limited liability company "Centre d'Information du Cobalt" has been entrusted with the execution of the Institute's program. The Centre is located in Brussels, at 35, rue des Colonies, and is represented in the United States by the "Cobalt Information Center" at the Battelle Memorial Institute. A research program of fundamental studies is being sponsored and, through the dissemination of technical data, these informational centers assist users and potential users of cobalt.

According to the Cobalt Development Institute, cobalt reserves and production capacities are now sufficient to give consumers assurance of regular and abundant supply, enabling them to undertake, without apprehension, the manufacture of new products using cobalt.

RIFLE MAKER'S TARGET: LOWER PART COSTS; GRC ONE-PIECE DIE CASTING SAVES 86%!



Automatic safety catch shown at left, die cast by GRC in one piece, replaces safety catch formerly assembled from 3 separate parts. Saving 12c per unit!

GRC die casts automatic safety catch for Crosman Arms Co. for less than 2c each—formerly 14c each. 1/7th of former costs!

The three-piece assembly of an automatic safety catch for the famous Crosman gas-powered rifle cost over 14c apiece. GRC's unique one-piece die casting techniques produce a functionally identical catch at a cost of considerably less than 2c apiece.

A saving of about 86%!

These Cost Sheet facts tell their own story:

Parts A, B & C plus assembly .....$143.00 per thousand
GRC 1-piece integral die casting .....$ 16.50 per thousand

Saving $126.50 per thousand

This is just one example of the way Gries helps industry cut costs. By precision die casting of zinc alloy tiny parts in one piece—and in one automatic operation—substantial savings in time and money are realized. Designs can be simplified, reducing or completely eliminating machining and assembly operation. The die cast Crosman catch is not only lower in cost, but is actually a superior part; one-piece casting eliminates possible loosening of assembled parts and provides greater precision. Better appearance, too, resulted from GRC's die casting design flexibility.

Gries' techniques can make parts to the most precise specifications and mass-produce them in quantities of 100,000 to many millions. Smallness is unlimited (maximum weight ½ ounce, maximum length 1¾ in.) Widest scope of design is available.

An informative Die Castings Bulletin is available. Send for your copy.

Gries Makes Extensive Line of Die Cast Zinc Alloy Threaded Fasteners

Gries produces by their exclusive die casting technique a line of high quality, low cost threaded fasteners, including wing nut, cap nuts, wing screws, round-head thumb nuts, round-head thumb screws, rivets, which are available in a wide range of sizes. Quick delivery from stock. Special to order. All are non-ferrous, rustproof with clean threads and bright finish. GRC mass production techniques provide lower costs. A new bulletin is now available. Write for your copy of Gries Industrial Fasteners Bulletin.

GRC "Intercast" Die Casting Offers Multiple-Parts Units with Movable Parts

In one automatic operation, Gries can "intercast" die cast tiny parts with movable elements, completely assembled, trimmed and ready to use. Elements fit precisely, yet move freely. Production of individual multiple-unit products or continuous "intercast" units is fast, economical and unique.

The "sister-hook", picture frame swivel rings, scissors, loose-leaf binder rings are 2-elements movable "intercast" parts, whereas the chain shown in the photo is an example of continuous "intercasting". Send for samples and full information.

See us at Booth 421
Design Engineering Show
May 20 - 23, N. Y.

GRC Diecast Gears and Pinions in One Piece at Lower Unit Costs

The exclusive Gries die casting of gears and pinions in one operation produces one-piece assemblies faster at less cost. Cast with shafts or center holes or in combination with cams, hubs, etc., permitting wide design flexibility. Many combinations from stock dies available at no tool cost. Write for full information, samples.

WORLD'S FOREMOST PRODUCER OF SMALL DIE CASTINGS

GRIES

GRIES REPRODUCER CORP.

157 Beechwood Ave., New Rochelle, N. Y. NEw Rochelle 3-8600

For more information circle No. 41 on the Reader Service Card

NEW SERVICE FOR THE DIE CASTING INDUSTRY

A rebuilding and modernization service for casting machines and related equipment is now being offered to the die caster by The Pilliod Co. located in Swanton, Ohio, 20 miles southwest of Toledo. Mr. F. C. Ziesenheim, representing sales, has served the industry for 25 years in the field of sales and sales management with the Lester-Phoenix, HPM and B & T Machine. Mr. Joseph Kaul, serving as Chief Equipment Engineer, retired recently from the Doehler Jarvis Co. completing 32 years as Chief Equipment Engineer having designed and supervised construction of all their die cast equipment to include the world's largest die cast machine.

Presently the services of these men is being offered to the industry in the field of machine rehabilitation and modernization. The Pilliod Co., organized in 1909, is fully equipped to completely rebuild to your requirements; formerly constructed large equipment for steam locomotives and more recently general industry requiring large type machine equipment.

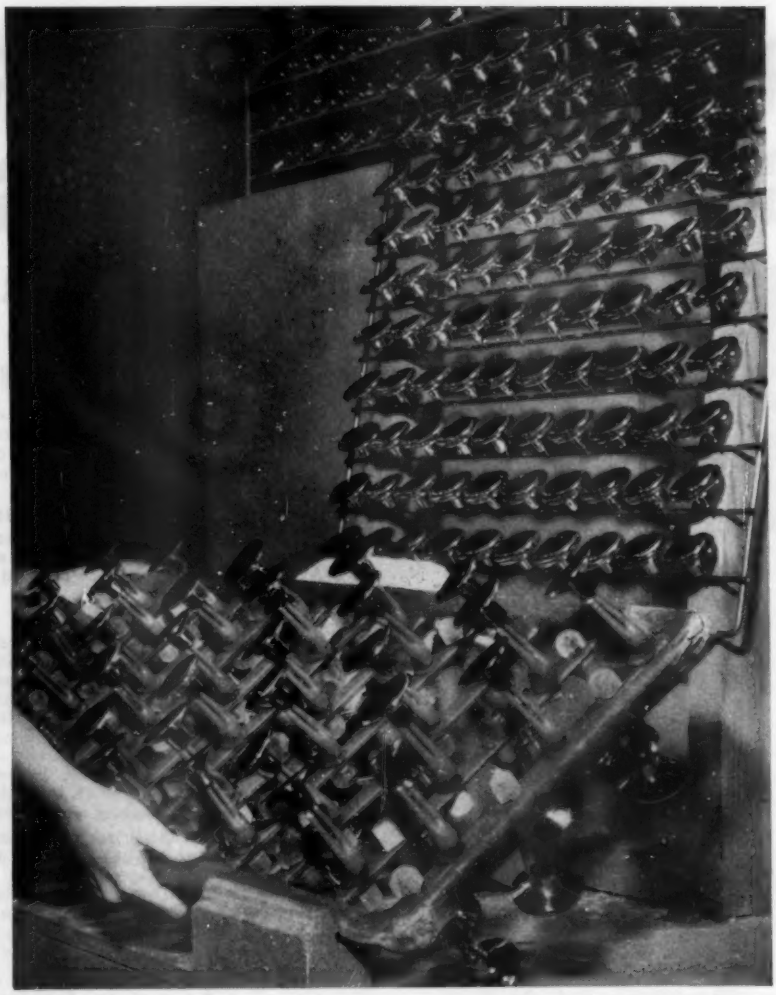
Present casting machines can in most cases be converted, if desired, for operation from a central hydraulic system using water. Conversions make a much safer machine to operate by reducing fire and other hazards, also invariably effects a 20% min. production increase. Hydraulic valves for operation from water system at a maximum of 1500 PSI and safe electric control circuits are available. Special core pull or ejector cylinders can be designed or built to your specifications.

MONSANTO TO PRODUCE ETHYL SILICATE

Production of polymerized ethyl silicate has just been started by Monsanto Chemical Company's Inorganic Chemicals Division plant at Everett, Mass., it was announced here today.

At the same time, the company announced an exclusive contract for distribution of the product to the investment casting industry has been arranged with Riches-Nelson Inc., of New York.

Polymerized ethyl silicate previously had been produced in England by the company's British subsidiary, Monsanto Chemicals Ltd., but had not been made by Monsanto in the United States.



FEDERATED ALLOYS
FOR THE DIE CASTING INDUSTRY

DI-METAL . . .
a zinc base alloy of high purity, produced in three grades to meet all required mechanical properties.

ALUMINUM ALLOYS . . .
produced by Federated to conform to the ASTM, SAE, AMS, USN, Federal and AMS specifications.

Federated has 12 plants and 22 conveniently located sales offices which can give you expert assistance in choosing and applying a die-casting alloy; and which assure you of prompt delivery when you require it.

FEDERATED products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust

Four facts prove Federated's quality claims for Di-Metal Alloys

1. Only special, high-grade zinc, 99.99 percent pure, is used to make Federated Di-Metal.
2. The zinc is refined by American Smelting and Refining Company, which developed and perfected the strontium method of electrolytic production for the most accurate control of lead content.
3. Alloying ingredients are added in exact proportions under the direction of Federated metallurgists.
4. Spectrographic or quantometric testing, supported by chemical analysis, controls the quality of every melt. Not a pound of untested metal is shipped by Federated.

Federated field specialists work from 22 offices and 12 plants throughout the United States. One is always near by if you need emergency help.

Call your nearest Federated office. Ask for more information about our Di-Metals. It will pay you well to try them.

Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

For more information circle No. 37 on the Reader Service Card

BARTLETT ELECTED PRESIDENT OF HORIZONS

K. M. Bartlett

The election of K. M. Bartlett as president of Horizons Incorporated, materials and process research organization of Cleveland, Ohio, and Princeton, New Jersey, was announced today following a meeting of the board of directors.

Bartlett joined Horizons in 1955 as executive vice president. Prior to that, he was, for 26 years, associated with the Thompson Products Company, Cleveland. With Thompson, he served in various administrative capacities including manager of its Metallurgical Products Division and manager of research in central staff.

Bartlett has been a member of various NACA, Navy and Material Advisory Board Committees. He was a founder and first president of the Investment Casting Institute, a trade association for precision casting industry.

NEW MEMBERS ELECTED TO ICI

Five new companies have been elected to membership in the Investment Casting Institute, Chicago, according to an announcement by K. W. Thompson, Institute president.

Companies and their official Institute representatives are: L. Sonneborn Sons, Inc., New York City, Henry Levkoff; Gray Syracuse, Inc. Manlius, New York, R. E. Gray; Hitchiner Manufacturing Co., Inc., Milford, New Hampshire, J. H. Morison; F-R Machine Works, Woodside, New York, S. Brotman; and Electronicast, Division of Nilsen Manufacturing Co., Addison, Illinois, P. A. Nilsen.

The Investment Casting Institute is composed of more than 50 producers of precision made parts by the investment casting process.

SHALLWAY FORMS NEW DIVISION

Establishment of a Used Shell Equipment Division was announced by Shallway Corporation of Connellsville, Pa. and Palo Alto, Calif., the nation's oldest shell molding equipment distributor.

According to Shallway officials, the new division will make it possible for foundries wishing to experiment with shell molding to purchase a shell mold machine and either pin-type or vacuum-type shell fuser and a simple sand-resin blender for less than the cost of one new shell mold machine. The Division will also handle used shell core blowers and related equipment.

HPM ANNOUNCES APPOINTMENTS

The Hydraulic Press Mfg. Co., a Division of Koehring Company, Mount Gilead, Ohio announces the following promotions: William J. Fath has been promoted to works manager and Warren E. Beck succeeds Fath as production control manager. A. L. Wallace succeeds Beck as assistant production control manager.

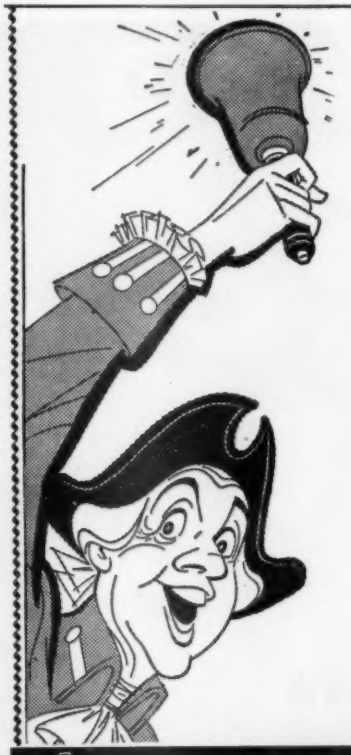
HNILICKA APPOINTED AT NRC

National Research Corp. has announced the promotion of Milo P. Hnilicka to the position of engineering associate.

Robert A. Stauffer, in making the announcement explained, "The position of associate at NRC was created to enable us to extend the highest possible recognition to people of outstanding professional talent in research and engineering. Associates are eligible to the same privileges as department heads but with a minimum of administrative, budget control and supervisory responsibility. The position is believed to provide an atmosphere which permits the associate to exercise his inventiveness and imagination and enables the company to recognize the results of such efforts in a fashion ordinarily considered available only to executive positions."

Hnilicka is a native of Czechoslovakia and received his education at State College for Technical studies, at Prague followed by six years at Supreme School of Engineering (University of Prague).

For more information circle No. 81 on the Reader Service Card



Hear Ye... Hear Ye...

STROH NOW HAS FULL FACILITIES FOR ALUMINUM DIE CASTING!

As one of the oldest Die Casting companies in the Mid-West, we are pleased to give notice of our recently completed facilities for ALUMINUM DIE CASTINGS. STROH products have always combined the experience of the past with the vision of tomorrow. Our expanded operations will continue to be unsurpassed in every respect.

INQUIRIES INVITED!

STROH DIE CASTING CO. INC.
11123 W. Burleigh St., Milwaukee 10, Wisconsin

MELTING ALUMINUM?

new, improved Haviland Flux for dry dross at lower operating temperature

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Manufacturers of processing chemicals for the metal trades

For more information circle No. 44 on the Reader Service Card

ALLIED RESEARCH HOST TO GERMAN INDUSTRIALISTS

Allied Research Products, Inc., Baltimore manufacturer of the Iridite chromate conversion coatings and ARP Plating Chemicals recently played host to a group of 20 visitors representing many varied types of manufacturing industries of Germany and Austria.

The visit was arranged in conjunction with the German Educational Travel Association, an organization whose purpose it is to promote industrial and commercial relations between Germany and other countries. The organization is a result of the valuable work in the field of industrial travel and exchange initiated by the United States Government under the Marshall Plan but the program is now entirely privately sponsored by German industry.

The group toured the Allied plant and laboratory facilities, as well as the electroplating facilities of the host's subsidiary company, Allied Metal Finishing Corporation. Many of the visitors, of course, were already familiar with Allied's products and were anxious to obtain specific information during the visit, as well as to make arrangements to procure material, either through export or through Allied's foreign licenses.

The visit was a highlight of a complete tour covering some 20 selected companies in the Midwest, Great Lakes and Eastern Seaboard regions.

MACHINERY SALES CO. APPOINTED HPM AGENTS

Machinery Sales Co., Los Angeles, has been reappointed exclusive representative for The Hydraulic Press Mfg. Co., Div. of Koehring Co. The territory covered under the new agreement covers southern California, Arizona and Nevada. The announcement was jointly made by W. H. Bennett, president of HPM and D. N. Macconel, president of Machinery Sales Co.

Machinery Sales Co. has set up a specialized service to handle HPM's complete line of hydraulic press equipment. This includes presses for the metal working and process industries, plastics injection molding machines, plastics compression and transfer molding presses and die casting machines.

No announcement has been made whether Machinery Sales will handle the complete line of hydraulic fittings and components manufactured by HPM.

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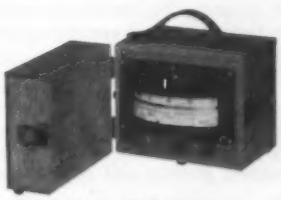

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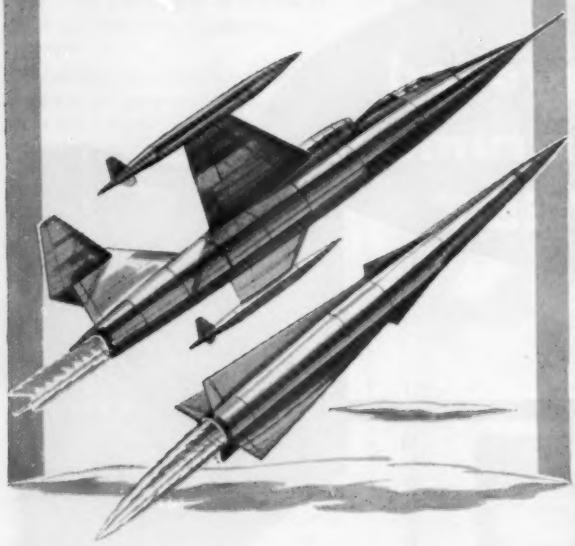
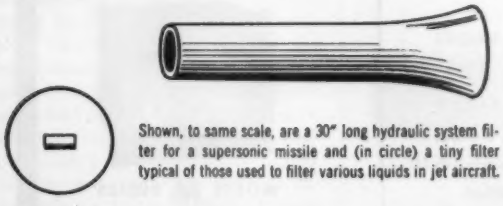


● The critical operating conditions of today's jet aircraft and missiles could not be met without the dependable, ultrafine filtration of fuels, propellants, lubricating and hydraulic fluids provided by modern, porous metal filters. They operate reliably at temperatures from —325°F. to +550°F., removing foreign particles as small as two microns, often in the presence of corrosive substances that would ruin ordinary materials.

Metals Disintegrating Company was the first producer of bronze filter powder, the basic material from which porous metal filters are made, and today makes a wide range of precisely graded spherical metallic powders that meet the most exacting physical and metallurgical requirements.

If you have a problem involving fine filtration, porous metallic filters may be the solution. Metals Disintegrating Company makes only the filter powder—not complete filters —but we will be happy to send you a list of filter fabricators.



Shown, to same scale, are a 30" long hydraulic system filter for a supersonic missile and (in circle) a tiny filter typical of those used to filter various liquids in jet aircraft.

Remember——for metal powders your best source is Metals Disintegrating Company, world's largest manufacturer of finely divided metals.

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Fire-Resistant Hydraulic Fluids For The Die Casting Industry

Part 5: Change-Over Practice

by **CHARLES R. SCHMITT,** Manager,
Lubrication Department,
E. F. Houghton & Co.

EXCELLENT as petroleum oils are as a hydraulic medium for transmitting power, industry has come to realize that they have one weakness — they burn. Under pressures ranging from 150 to more than 5,000 p.s.i., oil from a broken fitting or leak is discharged in a form of mist or spray. If this contacts flame or high heat, there can be trouble. At times, there has been serious trouble — endangering lives and valuable machinery, as well as interrupting production.

It is no wonder, then, that industry has turned to the use of fire-resistant hydraulic media in order to play safe. Such fluids, as offered commercially and used by both the U.S. Navy for its ships and by industry, are divided into two main groups — those using water as the basis for their fire resistance, and those based on chemical compounds which are resistant to burning or will not support combustion.

Through careful study of service applications, the pioneers in the testing of these fire-safe fluids have learned much about their handling in the past few years, their strong points and weaknesses, and the precautions which should be observed in preparing machines for change-over from oil. These points, gained from long and close experience, may help users of hydraulic equipment to employ these new and little known fluids with good results and full satisfaction.

Aqueous type safety fluids consist essentially of up to 50% water combined with a glycol, a water-soluble thickener to give body to the fluid, and various additives to increase oiliness value and oxidation resistance, also to inhibit against corrosive tendencies. The water content assures safety from danger of fire.

Synthetic fluids supplied for hydraulic use are largely from within the phosphate base type; chlorinated hydrocarbons have also been used either alone or in combination with certain phosphate esters.

All of these fluids, aqueous or non-aqueous, are high in specific gravity, whereas most pumps are designed for the lower gravity petroleum oils. What were formerly believed to be "wear" failures are now suspected to be tied in with unsatisfactory fluid flow within the pump. Some pumps are being redesigned to permit streamlined fluid flow at all pressures.

Because it is well established that fire-resistant fluids, regardless of base, possess high film strength as measured by standard testing machines, it is necessary to look further than at the fluid itself when troubles occasionally arise. It has been our experience that the majority of such troubles could be traced to two causes: mechanical deficiencies in the system, such as inadequate pump porting, or incomplete preparation of machines prior to changeover to fire-resistant fluids.

Because this matter of preparation is so important, we insist in our own company on a close check of all details listed on an accompanying chart. This check is made by lubrication engineers specially assigned to that duty. By this personal supervision at the time of change-over, we have reduced operation difficulties to a bare minimum. In publicizing certain of these crucial check points, we feel that distinct service is being rendered to those who contemplate going over to fire-resistant hydraulic fluids.

Certain precautions to be ob-

. . . MORE ON FIRE-RESISTANT FLUIDS

This is the fifth of a series of basic articles on the different hydraulic fluids currently available for use in die casting machines and presses operating in or near hazardous areas. Part six will be:

June — Fire-Safe Fluids Mean Plant Safety, by Lawrence Jackson, Withrow Die Casting Co.

STEPS REQUIRED FOR PREPARATION OF HYDRAULIC SYSTEM WHEN CHANGING TO AQUEOUS BASE FIRE-RESISTANT FLUID

1. Completely drain system of previous fluid:
   - Reservoir
   - Accumulator
   - Coolers
   - Lines
   - Cylinders
2. Disconnect and remove filters and intake pipe strainers.
3. Wipe reservoir dry with lint-free rags. If there is paint on inside surface, remove by commercial paint remover or hot caustic.
4. Reconnect system; clean and reinstall intake strainers.
5. If petroleum oil was previously used —
   (a) Fill machine with light hydraulic oil.
   (b) Operate machine for 20 minutes.
   (c) Pump out sump; drain all accumulators, cylinders and coolers.
   (d) Wipe reservoir clean.
6. Fill with fire-safe fluid — including accumulator.
7. Install filter.
8. Cycle machine for 10 minutes.
9. Check reservoir level; if low, fill to level.
10. Check all piping for leaks, and tighten if necessary.

IF PHOSPHATE BASE FLUID IS REPLACING HYDRAULIC OIL

All residual petroleum oil MUST be thoroughly removed; otherwise it will be dissolved in the ester and lower the fire resistance.

1. Drain system as specified.
2. Clean reservoirs as specified.
3. Blow lines clear with dry low pressure air.
4. Pump bodies and large valve bodies should be opened and swabbed dry by hand.
5. If bladder type accumulators are used, replace bladders with butyl rubber type.
6. All low points in piping system must be opened and drained.
7. All filters and strainers must be removed and cleaned.
8. All paint must be removed from internal surfaces.
9. Replace leaking seals; install special dynamic seals if type now used is affected by fluid.
10. Reassemble and connect components.
11. Fill system with phosphate ester fluid.

served are common to both aqueous and non-aqueous fluids. The chart accompanying this discussion is made up on the basis of general points, plus the special considerations necessary for each type of change-over.

PAINT REMOVAL

It is necessary, first of all, to remove any type of oil resistant paint that is present and which would come in contact with the fluid. All types of fire-resistant fluids tend to soften and peel off the paint which may later gain entry to the hydraulic circuit and thereby interfere with the operation.

Removal of such paint is frequently extremely difficult and time-consuming. It is often necessary to resort to actual hand scraping following the use of a commercially available type of paint remover. The paint remover is placed on the surface of the paint which, after a period of time, becomes softened and loosened to the point where it can be scraped off.

Some of our customers have used caustic fluids which, when mixed with hot water, attack and remove the paint. One customer puts in a caustic solution, then, by means of a steam line, allows steam to bubble into the caustic until the reservoir is filled. This accomplishes two things. First, it agitates the caustic solution so that good circulation is obtained and, secondly, it keeps the solution hot which makes it much more efficient and active. Following this, the solution is drained. Normally the paint will have been loosened and can be drained with the fluid. The reservoir is then filled with water and rinsed thoroughly, this operation being repeated many times until no trace of alkalinity can be observed. This can be tested by means of litmus paper.

Certain types of commercially available paints have been found to resist the action of water-base fire-resistant fluids. A list of these paints can be provided, if desired.

The same is true of plastic sealing compounds impervious to the hydraulic fluid. Names of satisfactory pipe joint compounds can also be supplied on request.

It is necessary to drain completely all parts of the system; in the case of low spots where drainage is not possible normally, connecting joints should be broken, cleaned and drained individually. This includes such items as valves, elbows and accumulators.

In the case of phosphate type fluids, all oil residue must be removed from the system as completely as possible. This is due to the fact that oil is soluble in the phosphate ester material and more than approximately 1% residue of oil could impair its fire-resistant qualities. For this reason, it is necessary to drain and, if possible, push out all traces of oil from the various parts of the system using low pressure air. Hand wiping of the reservoir is essential.

Where the systems are so complex and inaccessible that actual draining and hand wiping are not possible, the fluid itself can be used as a flushing medium. Under such circumstances, the fluid

ALUMINUM CASTINGS
for future
AUTOMOBILE PRODUCTION

Will they lower costs as well as weight?

By F. S. Ross, Vice-President in charge of Engineering Centr-O-Cast and Engineering Co.

For years, European automobile manufacturers have employed aluminum castings to reduce vehicle weight . . . permitting smaller engines and lower fuel consumption. In America, where fuel economy is not a major problem, the future of aluminum automotive castings depends on different advantages of lightness . . . better steering, rideability, unsprung weight . . . and on cost. Some engineers believe that only by reducing unit costs will aluminum castings replace ferrous metals.

But can modern fabricating techniques make a lower-priced part from a higher-priced raw material? In many cases, the answer is yes. A recent article in Modern Castings magazine, entitled "Centrifugal Casting of Unusual Shapes in Non-Ferrous Metals," outlines how the centrifugal process can greatly cut unit cost. The specific example is a torque converter component, and on this part, savings of more than 20% over previous materials and methods are reported. Similar savings have been effected on other aluminum parts such as power steering housings, transmission housings, and automatic transmission extensions.

Die casting, due to its accuracy and speed, has also resulted in cost reduction with aluminum. As in centrifugal castings, closer dimensions are held than with sand-cast ferrous metals, thus reducing or eliminating finishing operations, and the aluminum alloy's faster cutting speed makes further savings in machining possible.

Although many components of our cars are already cast aluminum, research and development work on gear boxes and engine blocks may open up the largest volume application of all. Engine block research is in an advanced stage, and the next few years should see a major conversion to aluminum here.

With our facilities, our experience (from idea to finished product) in permanent mold, centrifugal mold, and die casting, and our location right in Detroit, we at Centr-O-Cast & Engineering are in an ideal position to lend assistance to not only automotive designers but those in other fields as well. Engineers who have new aluminum applications in mind, and would like to know details of fabricating techniques or costs, will find that we can give them useful information, promptly.

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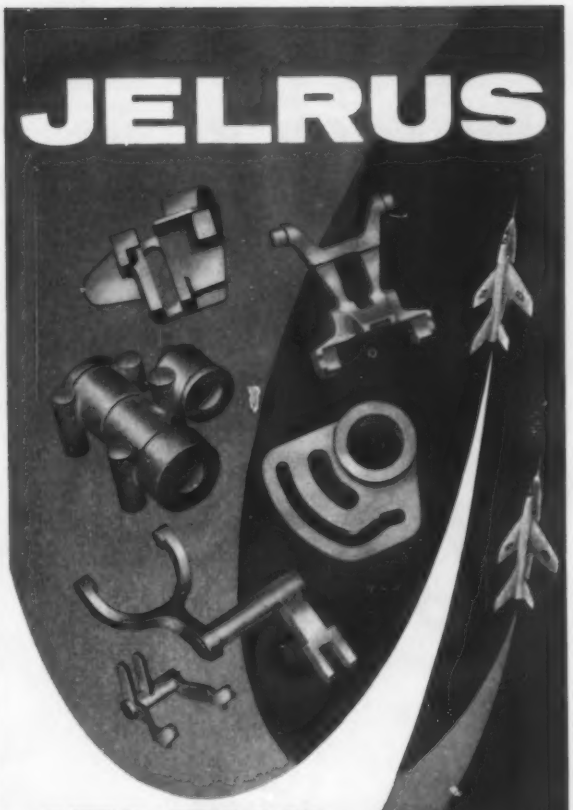

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should be introduced into the machine and allowed to circulate for several hours until it is hot enough to do a good job of cleaning. During this period, any paint which is in the reservoir will be loosened and most of it can be readily removed. If it is impossible to get at the reservoir to remove the paint, this flush of the phosphate material must be continued until the paint peels off and is carried to the filters by the fluid.

This fluid used for flushing can be drained from the machine and stored for similar use in other machines.

PACKINGS

The non-aqueous types of fluid will have a deleterious effect on normal types of packings which are compatible with hydraulic oil. In the case of static or non-moving seals, they will have a swelling effect in time, although this may not have a serious effect on the system inasmuch as they will simply swell and tighten up in the aperture. However, if portions of the system containing these seals are dismantled in time, it will then be necessary to replace them

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- Will outlast iron and alloy iron goosenecks by as much as 4-5 years.
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- Designed and made of special alloy *steel*, they prevent cracking . . . bottom breakout . . . spout erosion.

Each Dodge Special Alloy *Steel* Gooseneck is custom made to specifications by the Finished Products Division of Dodge Steel Company. Facilities are available for producing any size gooseneck for any die casting machine. Goosenecks are furnished either rough machined or machined with sleeves. Dodge provides a complete engineering service in the designing and production of steel goosenecks.

Your inquiries are solicited, without obligation, of course. Ask too, about pots and other die casting machine parts including nozzles, spouts, plungers, etc.

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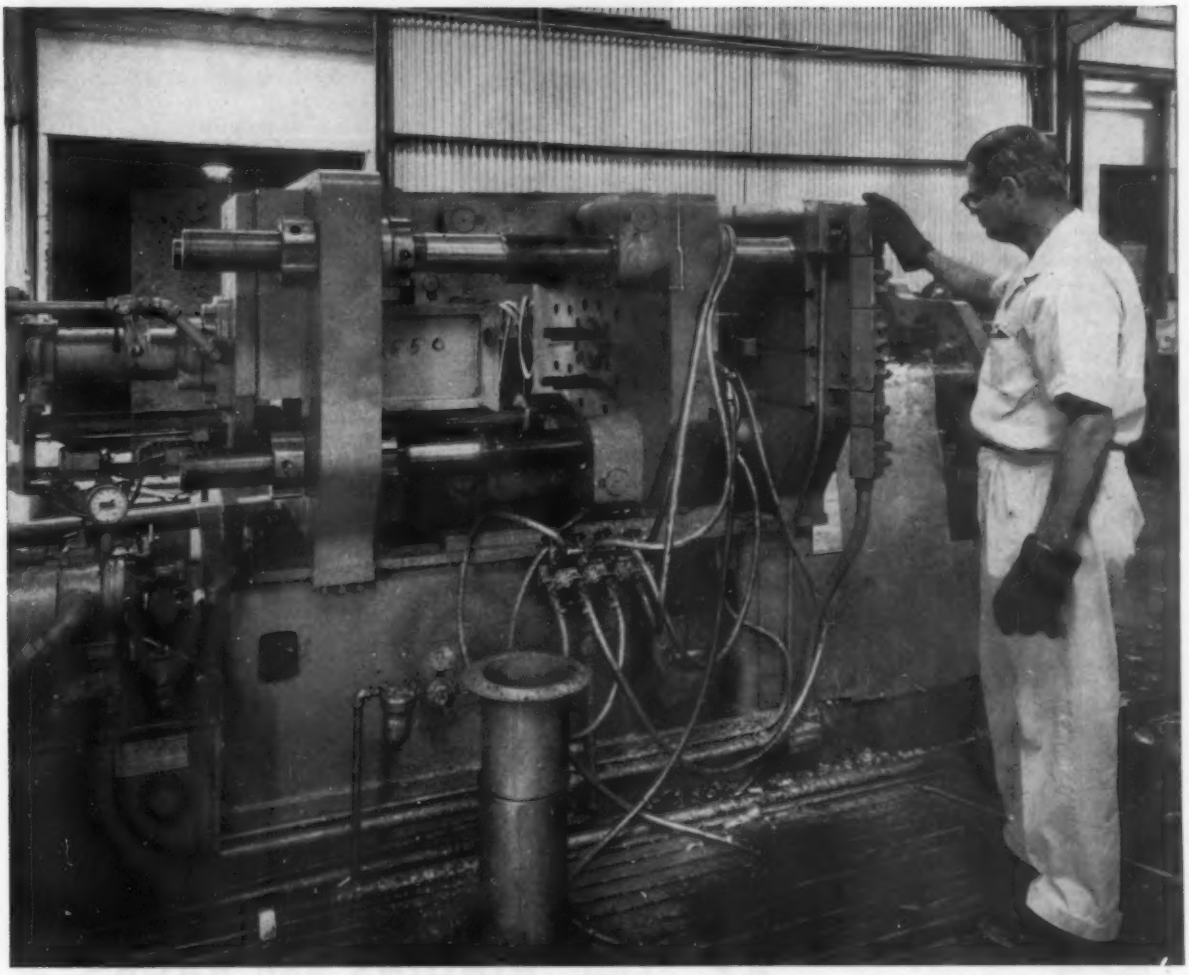

Typical die casting machine, using dies of Cr-Mo-V (High V) at Production Die Casting Company, Houston, Texas.

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Any type of die casting, whether lead, aluminum or magnesium, can be performed economically with Cr-Mo-V (High V)—Bethlehem's 5 pct chromemoly tool steel, with 1 pct vanadium.

Cr-Mo-V (High V) provides economical service in die casting because of its resistance to wash and erosion, and because it has the toughness to stay on the job for long periods prior to the development of a fine network pattern of heat-checking.

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Speaking of heat-treatment, you've never seen the like of Cr-Mo-V (High V), for it's a uniformly deep-hardening steel, with minimum size change and warpage. Even in massive sections it can be heat-treated to a uniform hardness as high as Rockwell C 45-47. Moreover, it's made by a controlled melting procedure, and its quality is checked by means of ultrasonic testing.

Your Bethlehem tool-steel distributor will be glad to furnish additional information about Cr-Mo-V (High V). Or better still, why not give it a trial run at your first opportunity. That's the best way to learn how good it really is.

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2. Ultrasonic tested for quality.
3. An easy grade to machine; Brinell 217 max.
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BETHLEHEM STEEL

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with new seals which are compatible with non-aqueous fluids. This data is available from Houghton or from your packing supplier.

In the case of dynamic or moving seals, such swelling of the seals will cause them to tighten and rub on the moving parts to the point where premature wear or even failure might occur. Therefore, it is very much preferred that removal and replacement of these seals with compatible types be done at the time of the change-over. In the case of accumulators using a rubber bladder to separate the gas from the fluid, it will be necessary to use a butyl rubber bladder and this should be changed at the time of the conversion.

Those using water-base (glycol thickened) fluids need not be concerned with the effect on standard seals used with petroleum oil. The water base fluids do not adversely affect such seals and, therefore, no problem exists from this standpoint. In some pumps, cork impregnated rubber gaskets are used as sealing materials and should be replaced with mechanical type rubber seals designed for this purpose.

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aluminum . . .
▶ permanent mold castings
▶ die castings

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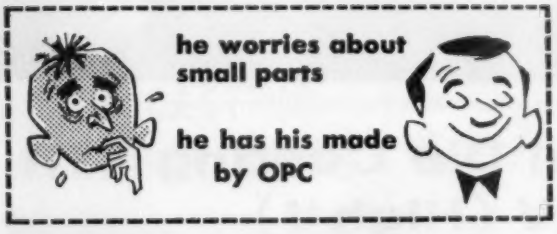

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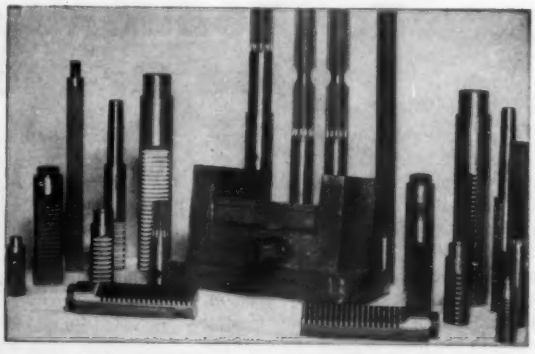

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Fluid flow conditions with the fire-resistant fluids have been found to have a considerable effect on the operation due to the higher specific gravities of these fluids, as already mentioned. This is particularly true of the intake pipe fluid flow because it is necessary to obtain sufficient fluid in the entry of the pump which is provided only by force of atmospheric pressure. Therefore, it is necessary to see that a minimum distance from the fluid level to the pump intake is maintained at all times.

One of the larger pump manufacturers has recommended that a vacuum gauge tapping the suction line immediately adjacent to the pump inlet port should never read more than 5" of mercury. In the event of a higher reading, it would be necessary to decrease the distance between the oil level and the pump. Sometimes, if the reading is only slightly off, this may be corrected by using a larger size pipe into the intake. If everything else fails, the speed of the pump should be decreased to provide a lower displacement capacity of the pump. These precautions are necessary to overcome the possibility of cavitation or starvation of the pump.

Charts have been devised to determine the sizes of pipes in hydraulic circuits when the gallons per minute output of the pump are known.

Another point is the question of intake strainers located on intake pipes. Normally, such strainers are of varying mesh sizes and are usually in the form of a screen wrapped around a cylinder. In order to insure good intake conditions, it has been found that a mesh of 60 or less should be used, as anything smaller interferes with good, smooth flow into the pump. In the case of water base fluids, these screens should not be coated with either cadmium or zinc (galvanized) since such materials are adversely affected.

In the early days of experimentation with fire-resistant fluids, clogging of 100-mesh wire filters was a problem, which resulted in the 60-mesh filters being adopted. Nickel plated filters are now available at no extra cost. Magnetic plug assemblies placed in the reservoir near the intake pipe have been successfully employed to trap steel particles that would pass through coarse filter screens and tend to wear the pump.

MARVEL Synclinal FILTERS

for Fire Resistant Hydraulic Fluids

SUMP PUMP (cutaway)

IMMEDIATE DELIVERY

Meet J.I.C. Standards

LINE TYPE (cutaway)

If you are switching from regular hydraulic oil to either the Aqueous Base or Synthetic type Fire-resistant fluids, your present filters may need replacement.

Our Catalogs #200 and #400 contain complete engineering data and dimensional charts for all sizes (5 to 100 G.P.M.) Marvel Synclinal Filters which have been designed for exclusive use with these fluids.

Check filter requirements specified by the manufacturer of the type of fluid you are using—or intend to use—then select your filter from our catalog and get IMMEDIATE DELIVERY.

Or, drop us a note stating brand name or type of fluid, whether Aqueous Base or Synthetic and we will, without obligation, recommend the proper type filter for your requirements.

Many Original Equipment Manufacturers are already installing Marvel Synclinal Filters for Fire-resistant fluids as Standard Equipment.

More and more Die Casters and Plastics Molders are replacing regular hydraulic oil filters with Marvels.

It will pay you to investigate Marvel Synclinal Filters for efficient filtration and dependable protection on your hydraulic and other low pressure liquid circulating systems.

EASY TO CLEAN

Marvel Synclinal Filters are sturdily constructed to give long and trouble-free service—yet may be easily disassembled, thoroughly cleaned and reassembled in a matter of minutes. Line type operates in any position and may be serviced without disturbing pipe connections.

Catalogs containing complete data available on request

Use coupon below or write for Catalogs available on request

MARVEL ENGINEERING CO.

7227 N. Hamlin Ave., Chicago 45, Ill. Phone: Juniper 8-6023

PMM-5

Without obligation, please send me complete data on Marvel Synclinal Filters, as indicated: —

- ☐ Catalog #107—For Hydraulic Oils, Coolants, Lubricants
- ☐ Catalog #200—For Fire-resistant Hydraulic Fluids (Aqueous Base)
- ☐ Catalog #400—For Fire-resistant Hydraulic Fluids (Synthetic)
- ☐ Catalog #301—For Water

Name .....

Company .....

Address .....

City .....

State .....

For more information circle No. 5 on the Reader Service Card

how Ajax induction melting meets investment casting requirements

. . . at Precision Metalsmiths, Inc.

The special melting requirements of precision investment casting are an old story to Precision Metalsmiths, Inc., Cleveland, Ohio. This one foundry melts ninety-two different ferrous and nonferrous alloys . . . often in small quantities. Many of these alloys require unusual protection from contamination during melting—and substantially all are made to extremely close analyses. Carbon content in some must be kept below .04%.

Only an Ajax-Northrup converter-powered induction melting unit could meet the requirements of versatility, purity, and economy so well. That's why four Ajax units now satisfy all the company's production needs. Three 17 pound capacity portable furnaces are each powered by 20 kw Ajax-Northrup spark gap converters; and the fourth, a fifty pound capacity tilting furnace, is powered by a 40 kw Ajax-Northrup converter.

Precision Metalsmiths standardized on Ajax because Ajax-Northrup units cost far less to operate and maintain in operation. They're ruggedly constructed to take the toughest kind of service in stride. Normal converter maintenance is limited to cleaning the gap chamber and inspection at three month intervals. For additional details, write Ajax Electrothermic Corp., Trenton 5, New Jersey, requesting Bulletins 14-B and 27-B.

Associated Companies: Ajax Electric Company — Ajax Engineering Corp.

AJAX NORTHRUP SINCE 1916

INDUCTION HEATING-MELTING

In the case of water-base fluids, elevated temperatures (above 130° F.) in the reservoir tend to dissipate the water too rapidly. When synthetic fluids are subjected to such temperatures, they thin down too much (low viscosity index) for good operation. For this reason, heat exchangers are recommended to control sump temperatures within proper limits.

Removal of an oil film from the reservoir surface of an aqueous fluid installation permits more rapid escape of air or gas bubbles, which in turn aids in obtaining optimum pump performance. When samples submitted to us for check after fluid installation reveal a definite petroleum oil content, it is apparent that no serious effort has been made to skim off the oil from the surface.

CHECK THE PUMPS

Pumps should be examined carefully to make certain that the sealing elements are proper and of the latest design so that all air leakage into the pump is eliminated. This will, undoubtedly, be known by the marketer of the fluid, and his representatives should be consulted at each change-over in order to make certain that all phases are properly attended to.

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BRUSH—primary producer of beryllium-copper alloys for casting, forging, rolling, extruding—offers the foundryman complete service on a full line of beryllium alloys for all uses.

Beryllium-copper, Beryllium-nickel and Beryllium-aluminum are available in casting ingot or master alloy form in standard and special composition.

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THE BRUSH BERYLLIUM COMPANY · 4301 PERKINS AVE. · CLEVELAND 3, OHIO

For more information circle No. 102 on the Reader Service Card

When a water-base fluid is being installed, the pump lubricant should be considered. Where grease is applied through a fitting, the soda-base type normally used when oil is the medium should be replaced by a water-resistant grease or mixed base type. Any leakage of the hydraulic fluid past the shaft seal into the bearing will emulsify the grease. Besides, entry of air will cause vibrations inside the pump, resulting in premature wear and lower pump life. Tests we have conducted on compatibility of greases with fluids have helped determine that aluminum, calcium and lithium base greases work well in such cases.

As with petroleum hydraulic fluids, it is often necessary to take samples of used fluid from the reservoirs of equipment and have them checked periodically to make certain that no contamination has occurred and that the fluid is being used properly. This will be evidenced by a lack of change in the physical and the chemical qualities.

WATER CONTENT

In the case of water-base fluids, it is often necessary to replenish the water content which is depleted in varying degrees according to the temperature of the operation and the design of the equipment. This particular item has not been as troublesome as it was once anticipated. In normal, well designed hydraulic systems, the temperatures can be controlled in line with the recommendations made by the J.I.C. (Joint Industries Conference) which recommends that reservoir temperatures be maintained at a level less than 130° F. Under such conditions and where the only chance for the escape of vapor is through the fluid intake breather, water evaporation from the tank is at a very low figure.

The water content is gauged by changes in the viscosity. This can be checked by running a viscosity determination and, according to charts furnished by the marketer of the water-base fluid, water is added as dictated by the level of the viscosity. Naturally, as the fluid thickens up, it indicates a loss of water and this must be compensated for by the addition of distilled or deionized water.

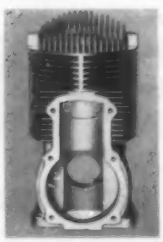
The chemical decomposition of water base fluids brought about by contamination or the malfunctioning of the hydraulic system, failure of the water cooler resulting in high temperatures, etc. can

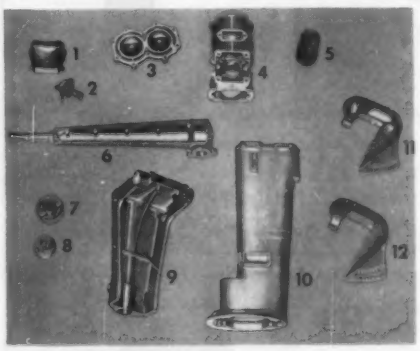
DIE CASTING REPORT

Streamlined—lightweight and rugged—thanks to advanced designing and use of die casting

4 cylinder sizes from one die!

Interchangeable cores in a master die enable Precision to produce 4 different sized aluminum cylinder blocks for West Bend.





Typical Aluminum Outboard Motor Parts

1. Transfer port cover
2. Gas pump cover
3. Cylinder head
4. Cylinder block
5. Steel bushing insert
6. Steering handle
7. Bearing cage
8. Slip clutch plate adapter
9. Swivel bracket
10. Drive shaft casing
11. Stern bracket
12. Stern bracket

This year America's waters are being churned by a steadily growing outboard motor population. New companies entering this field have had to meet stiff competition from the "old line" producers. How have they done it?

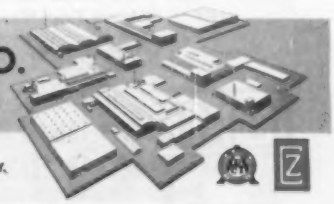
The West Bend Aluminum Company, of West Bend, Wisconsin, is a good example. Their Hartford Division is currently putting on the market a line of high performance outboard motors ranging from 2 to 25 H.P. One of the most important factors in cutting down on excess bulk and weight has been the strategic use of aluminum die castings. Cooperative planning on die-cast design of components helped achieve compactness, streamlined appearance and light weight. All this without sacrificing strength where needed.

For production and assembly savings, it will pay *you* to investigate the use of die-castings. Let the Precision team of experienced die design engineers look at your problem. The result! Savings on machining, assembly and unit cost!

Write on your letterhead for free copy of "DIE CASTINGS . . . UNLIMITED" Precision Castings Co., 42 Warren St., Fayetteville, N. Y.

PRECISION CASTINGS CO.

A DIVISION OF **HARSCO Corporation**



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Analysis of Used Hydraulic Fluid

Installed in	Conversion Date	Last Sample Taken	Service Period	pH	Visc.	Depletion
Machine No. 2173	June, 1954	March, 1956	21 mos.	8.1	207	None
Machine No. 2247	June, 1954	Jan., 1956	19 mos.	8.0	199	None
Machine No. 1748	June, 1954	Oct., 1955	16 mos.	8.1	196	None
Machine No. 1920	June, 1954	Oct., 1955	16 mos.	8.2	209	None
Machine No. 1392	June, 1954	June, 1955	12 mos.	8.3	199	None
Machine No. 1415	June, 1954	June, 1955	12 mos.	8.1	192	None
Machine No. 2046	June, 1954	Sept., 1955	15 mos.	8.2	205	None

FLUID CONTAMINANTS

	In Phosphate Base Fluid	In Aqueous Base Fluid
Water	Lighter — Can be skimmed from top.	Will mix — lowers viscosity.
Petroleum Oil	Completely soluble. Keep out.	Floats to top — skim off.

be determined by measurement of the pH. The pH limits can be obtained from the marketer and any pH lying outside these limits should be brought to the attention of the marketer for recommendations as to further steps to be taken.

Should the pH value go beyond the limits thus recommended, the fluid should usually be drained. Determination of pH can be made in the user's plant by means of Hydrion papers, available from a chemical supply house.

Water-base fluids should never be used in magnesium die-casting machines, nor in the presence of molten magnesium.

As an example of the periodic checking of used fluid, we might mention service rendered to one large user of water-base fluid, as per partial table above. This installation included over 250 piston-type pumps operating at pressures up to 4,000 p.s.i., for periods varying from one year to two years. Only three pump failures occurred — no more than would be expected from petroleum oil.

No additive depletion was observed in these samples nor in any from 23 other installations in that group. It is interesting to note that of 119 samples received from the user, 97 showed no change in water content. Nine showed a loss of 1% water, seven showed 2% and two a loss of 3%. Only one had a really significant loss of 6%.

We found in the instance reported above that there was a water *increase* in two samples — 1% and 2% respectively — indicating that contamination with water is a definite possibility.

Water in normal amounts, such as those brought about by condensation, can be tolerated by water-base fluids.

The water of condensation or through contamination, when introduced into phosphate ester base fluids, due to the water being lighter than the fluid, will float on top and can be removed by skimming.

Petroleum oil mixes with difficulty with water-base fluids and usually floats on top of the fluid where it can be skimmed off periodically.

In the case of phosphate base fluids, oil is completely soluble in these fluids and every precaution should be taken to keep oil out of the system. If, however, oil contamination is unavoidly en-

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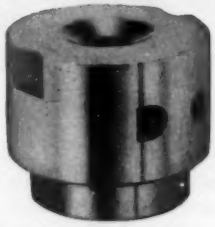

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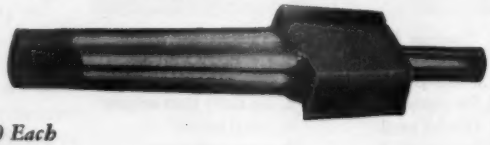

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LOS ANGELES 7, CAL. 3700 SOUTH MAIN STREET, ADAMS 3-8214

For more information circle No. 33 on the Reader Service Card

countered, it can be removed from the phosphate fluid by centrifuging. Usually, a per cent or two of oil can be tolerated.

SUMMARY

It will be noted from the procedure chart for change-over and preparation for a synthetic fluid that both types of fluids demand careful cleaning of the system before installation. Both types have their strong and weak points. The water-base group is less costly and more kind to packings; the synthetic type will withstand higher temperatures and has a better wear factor than the aqueous in a few types of pumps.

No hard and fast rules can be laid down until all the variables are known, which means that the technical representative of the supplier, from his experience, should be able to make a sound recommendation which the user can safely follow.

After that, the important move is to clean carefully and to check for performance. Machines have not yet become so automatic that their supplies, fuel and lubricants, require no supervision. With careful pains spent on the installation, fire-resistant hydraulic fluids will perform efficiently and save their cost many times over by their protection of lives and property.

AMERICAN SMELTING ENLARGING CENTRAL RESEARCH LABORATORIES

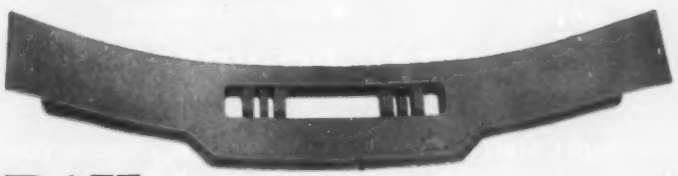
American Smelting and Refining Company is expanding its central non-ferrous metal Research Laboratories at South Plainfield, New Jersey, by one-third.

The Company's expansion and diversification, plus increasing applications for non-ferrous metals and elements necessitates the addition of more than 20,000 square feet of laboratory space, according to Dr. A. J. Phillips, Vice President in charge of Research.

The new laboratories will be devoted to asbestos application; to the production and study of high purity metals; and for research on refractory metals such as the rare earths and other high temperature metals.

A completely new wing will be added to the present laboratory structure, which was completed less than five years ago. Construction will begin immediately, and full operation is expected by the end of the year.

SCOTT
investment
castings



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You save considerable time, trouble, and expense when Scott investment casts your ferrous or non-ferrous parts.

Time, because Scott experience speeds the entire process of designing the part for casting. Scott specialists work with you right through from start to finish.

Trouble, because this division of Rolle is capable of taking the entire responsibility for casting performance. Petty day-to-day annoyances become Scott's worry, rather than yours.

Expense, because Scott takes a direct approach to every casting problem, eliminating false starts and waste. Scott's priceless years of actual production experience assure you maximum return on every investment casting dollar.

Further, as a Division of Rolle Manufacturing Company, Scott can offer you the most complete laboratory test and quality control facilities.

WRITE NOW for complete information on Scott's facilities for increasing your dividends on investment casting.

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DIVISION OF ROLLE
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For more information circle No. 9 on the Reader Service Card

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For Outstanding Structural Parts, Porous Media and Self-Lubricating Parts Requiring Any or All of These Properties . . .

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DESIGN ENGINEERING CONFERENCE TECHNICAL PROGRAM

The Design Engineering Conference will feature three major divisions in the technical program. These will be: Mechanical Sessions, Materials Sessions, and Electrical Sessions. Except for the opening papers on Monday morning, May 20, these three divisions will conduct simultaneous meetings.

The program for the three day technical session has been announced as:

MONDAY, May 20, 10 a.m.

Procedures in Developing New Designs. This will be a panel discussion and will feature a question and answer period. The moderator and members of the panel have not yet been announced.

TUESDAY, May 21, 9:30 a.m.

(Three concurrent meetings)

Mechanical Session — New Developments in Design and Application of Gearing — Darle W. Dudley.

New Developments in Design and Application of Cams — Harold A. Rothbart.

Materials Session — Metallic Materials — Charles R. Simcoe.

Ceramics and Refractory Materials — John H. Koenig and Edward J. Smoke.

Electrical Session — Selecting Motors with New NEMA Frame Sizes — Earl C. Barnes.

Static Switching Devices — Robert A. Mathias.

WEDNESDAY, May 22, 9:30 a.m.

(Three concurrent meetings)

Mechanical Session — Designsigning for Easier Machining, Handling and Assembly — Kurt O. Tech.

Hopper Feeding — Floyd E. Smith.

Materials Session — Plastics and Rubbers — Wyman Goss.

Coatings and Finishes — H. J. Reindl.

Electrical Session — Numerical Control for Machinery — Claude D. Coffin.

Designing Machine Tools for Automatic Controls — C. B. Sung.

As previously announced, there will be a group of several hundred exhibitors at the show. Booths will be staffed by men capable of answering questions perplexing the visiting engineers.

OPPORTUNITIES

jobs & equipment

Opportunities rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding, 812 Huron Rd., Cleveland 15, Ohio. Closing date: 1st day of month preceding publication.

POSITIONS WANTED

POSITION WANTED—Experienced plant superintendent or general foreman. Builders hardware in all foundry departments. Brass and bronze and aluminum almag. In all die casting departments and finishings. 24 years experience—age 45. Write Box No. 5157.

DIE CAST SOURCE NEEDED—Well established Cincinnati manufacturers representatives seek concern with facilities for producing die cast ornamental hardware trim. Concerns not owning their own finishing facilities need not reply. Write Box No. 5257.

POSITIONS OPEN

CERAMISTS METALLURGISTS
ESTIMATORS FOUNDRYMEN
and . . MECHANICAL ENGINEERS

WE ARE a recognized leader in Precision Investment Castings, aggressive, continuously growing. SHAW and INVESTMENT "X" Licensee.

WE LIVE in scenic Southern New Hampshire, close to the White Mts. 60 mins. to Boston.

WE OFFER good pay, advancement opportunity, ideal work conditions.

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.....HOW ABOUT YOU?

WRITE — HITCHNER MFG. CO.
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WANTED—A few choice territories still open for Distributors. AIR-LUBE (see our advertisement in this issue) is an accessory for die-casters. State territory you cover in your letter. Pierce-Waller Co., Kettering P. O. Box 2121A, Dayton 9, O.

RESEARCH METALLURGIST. We are seeking an exceptional young man for a position with unusual opportunities. Work directly with top management setting up research dept., investigating high temp. alloys, vacuum casting, and investment casting techniques. Give complete education and professional background in first letter. ALLOY PRECISION CASTINGS CO., 3855 W. 150th St., Cleveland 11, Ohio.

EQUIPMENT

FOR SALE—We have just acquired from a Carbide Plant two Hydraulic Ingot Presses of 150 ton capacity each together with Hydraulic Accumulator, Pump, Oil Tank, Intensifier and instruments. This set-up was in operation until a short time ago and is in perfect condition. Will sell entire package very cheap. We also have Stokes Model "F" Preform Press; Stokes Model "S4" Tablet Press (40 ton); Stokes Model P3 (80 ton); Kux Model 64 (35 ton); Colton No. 5 (25 ton); Patterson 24" x 36" Type "DJ"—jacketed Ball Mill (never used); Ball Mill Loaders and Unloaders (stainless bodies); Day (80 gal.) Blender, stainless body (new); Stokes Model 43A Oscillating Granulator (stainless discharge hopper); All the equipment listed is in perfect operating condition and attractively priced. GLOBE TRADING COMPANY, 1815 Franklin Street, Detroit 7, Michigan. Phone—Woodward 1-8277.

FOR SALE — Lester Phoenix Model 35 Type HHP2 die casting machine, cap. 6½ lbs. zinc, 100 ton, 18" x 20" die size, 9" opening. Cpl. with melting pot, hyd. pump, valves, controls. Aaron Machinery Co., Inc., 45 Crosby St., New York 10, N. Y. Walker 5-8300.

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LOW-PRICED SPECTROMETER
. . . is direct reading

Designed specifically for the small producer and processor of non-ferrous metals, a new Hilger direct reading spectrometer has been announced. The new instrument is said to be low priced and high in performance so that the small producer can now enjoy the advantages of a direct reading instrument that formerly only the larger companies could afford.

The new instrument will perform analyses for up to 11 constituents in two minutes or less with results indicated on a meter or a recorder. It is reported that extensive tests have shown the sensitivity of the spectrometer to be as high and reproducibility at least as good as, and generally better than, that obtained photographically, limited only by the souce conditions, homogeneity of the sample, and the intensity of the spectral line relative to the background.

Jarrell-Ash Co.
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die casting alloys

From ingots of Henning Zamak die casting alloys come products impossible heretofore. They permit unlimited design latitude for new products because they can be used in the filling out of fine detail and of thin sections, as well as the production of good surface texture. All are specifically made to meet the most precise needs at lowest cost.

Send today for fact-filled, pocket-size booklet to find out how Zamak alloys can meet your needs exactly.

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A forced convection furnace has been designed for many industrial heating operations such as aluminum brazing, tempering, drawing, normalizing, and hardening. The furnace can be used with or without special or protective atmosphere.

Fifteen standard models are available, with vertical lift and horizontal opening doors. Heating elements are of heavy duty, low watt density type, designed for low gradients between the element surface and the furnace temperature. The elements are protected in unique holders.

Very close gradients are automatically maintained by fans that circulate the atmosphere in the firing chamber. Control can be maintained over the entire 250F to 1875 heat range.

L & L Manufacturing Co.
For more information, circle No. 251 on the Reader Service Card

BRASS PLATING PROCESS
. . . for all types of metal

Exact control of brass plating color is said to be possible with a new plating process which is effective on all types of metals and prevents "bleeding out" on porous metals.

Products up to 33 inches square can be "Albanized" with a choice of brass finishes, including gold color or lemon yellow in bright reflective, scratch brush, dull, satin, and other effects.

Color control can be maintained on parts plated at wide intervals, thus permitting complete interchangeability of parts.

Albany Plating Co.
For more information, circle No. 252 on the Reader Service Card

TAP-LOK INSERTS
. . . in repair kit

The manufacturers of Tap-Lok inserts have made available a repair kit to provide a low-cost, easy, practical method of repairing worn, damaged and stripped threads. These inserts are self tapping steel bushings, internally and externally threaded, which increase the thread holding strength of aluminum, magnesium, brass, etc.

Damaged threads can be repaired in two easy steps—drilling the hole and driving the insert. The repair kit includes a quantity of inserts in the thread sizes chosen, a driving tool and illustrated instructions.

Groov-Pin Corp.
For more information, circle No. 253 on the Reader Service Card

TWIN DUTY GRINDER
. . . for light work

Recommended for light or intermittent duty grinding, a new model is offered as a single end, chip breaker grinder only, or as a combination chip breaker and diamond finishing grinder.

A self-contained pump and tank unit is incorporated into the machine along with special no-splash guarding. A flood of coolant is provided, giving continuous cool cutting and increasing diamond wheel life.

Hammond Machinery Builders, Inc.
For more information, circle No. 254 on the Reader Service Card

PROFILING GRINDER
. . . is fast, accurate

A new heavy-duty master profiler and contour grinder has recently been announced. The tool is especially designed and manufactured to fill the need in the tool and die shop for the fast removal of metal on heavy die sections.

Accurate and speedy free-hand rough and finish profiling is readily accomplished with this machine tool which will precision-grind large die sections to close specifications in a short period.

The Kindt-Collins Co.
For more information, circle No. 255 on the Reader Service Card

GLASS DISPERSIONS
. . . for metalwork lubrication

Two metalworking lubricants have been formulated with dispersions of glass in isopropyl alcohol.

Designated dispersions Nos. 239 and 240, they are applied to the work at room temperature, forming a dry continuous film which inhibits oxidation and surface contamination during the heating cycle. They form a protective coating for the forging of special alloy steels, titanium and other metals which are particularly subject to oxidation or gas absorption at elevated temperatures during pre-heating and forming.

The two dispersions differ only in the composition of the glass used in their preparation. No. 239 contains a glass with a fusion temperature of about 1100F, while the glass in No. 240 has a fusion point of about 1300F. The two dispersions are compatable, and may be mixed in any proportions to take full advantage of the temperature range.

Acheson Colloids Co.
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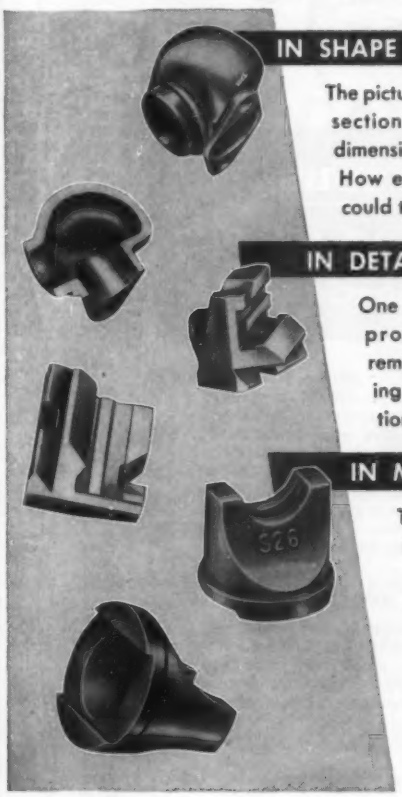
HERE'S HOW...

INVESTMENT CASTING ANSWERS DESIGN PROBLEMS

Investment Casting is a specific production method that fills a specific function. This process offers much greater latitude in shape, detail reproduction and choice of alloy than any other process.



IN SHAPE

The picture tells the story . . . from the cross section it can be seen that the inside dimensions are greater than the holes. How else but by Investment Casting could this be made in one piece?

IN DETAIL REPRODUCTION

One look quickly shows the machining problems — most of them stock removal. By using an Investment Casting 21 out of 45 machining operations were eliminated.

IN MATERIAL

These nozzles for a highway striping paint sprayer, were produced from cold rolled steel until ground glass was introduced into the paint for its reflective properties. To provide necessary wear resistance these parts are now cast in a non-machinable alloy. Performance was not sacrificed because of material limitations.

For more information ask for our brochure . . . its FREE of course.

These are a few examples demonstrating that the function of the part is the first consideration in design — and — the Investment Casting process was the economical answer.

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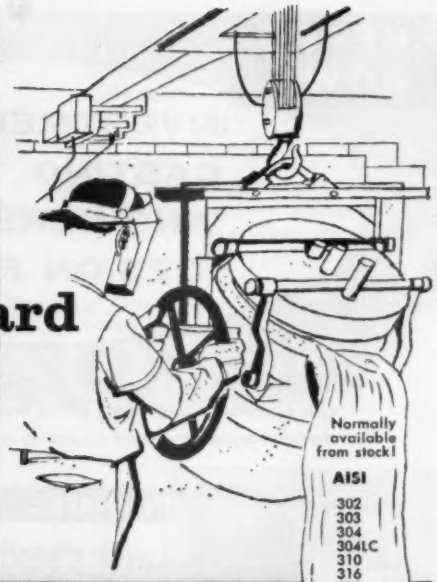

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5382
5385
5610
5628
5630
5631
5640

SAE
"H" B-2
"H" D-2
M-2
T-1
1010
4130
4145
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Extensive use of bearings is a feature of a recently-developed universal joint adjustable drilling head.

Primarily cast from aluminum, the head has a drive gear with heavy duty grooved ball thrust bearings on top and bottom of gear and heavy duty roller bearings top and bottom.

All drill spindles have double needle bearings in the locator arm and heavy duty grooved ball thrust bearings. Minimum centers on the head are 1⅝", and the maximum diameter pattern is 9¾".

Errington Mechanical Laboratory, Inc.
For more information, circle No. 257 on the Reader Service Card

CAVITY STEEL . . . for molds and dies

The company's new No. 3 cavity steel for plastic molds and die casting dies is available in a limited range of standard 24" wide sizes.

Plans are underway to process the steel into standard mold plates, cavity sets, and mold bases. The steel is pre-heat treated to 300 Brinell and can be oil hardened, carburized, nitrided or welded without losing its polishing characteristics.

At present, cavity plates will be made in the following thicknesses only: 1⅜", 1⅞", 2⅜", and 2⅞".

Detroit Mold Engineering Co.
For more information, circle No. 258 on the Reader Service Card

HYDRAULIC VALVE . . . built for die casting

A 3000 psi semi-automatic hydraulic valve has been especially designed for use in the die casting industry. It gives leak-free operation with water, glycol, or oil base hydraulic fluids.

Known as the E-400-X Series, is activated by the integral double-acting cylinder controlled by a single or double solenoid pilot-operated valve. For maximum safety, the valve is designed so it will not reverse itself in case of air or electrical supply failure.

They are offered in 1, 1½, and 2 inch NPT sizes, for line pressures up to 3000 psi. Sixty to 125 psi air is used for valve actuation.

Sinclair-Collins Valve Co.
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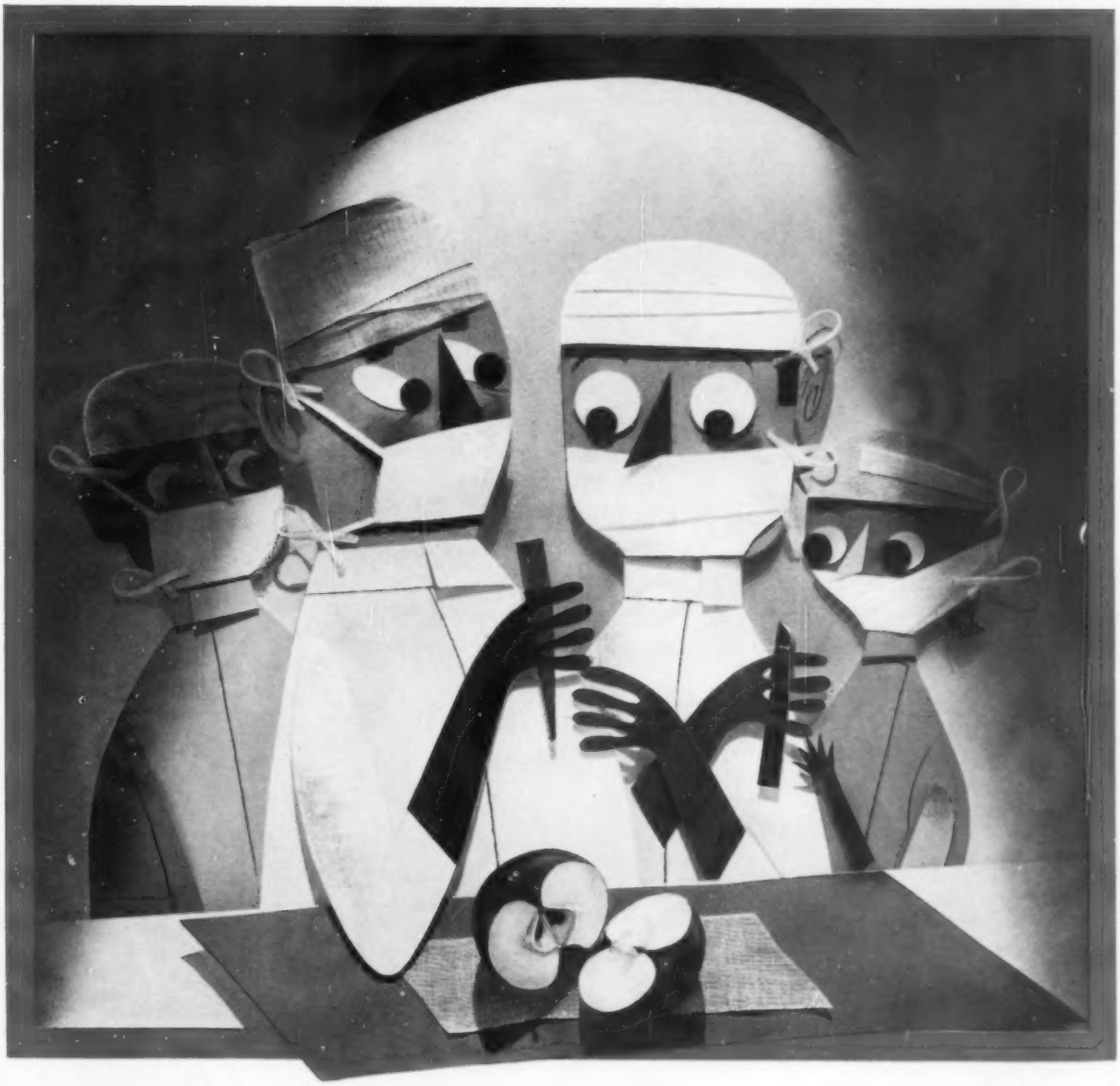

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